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# Janus, 1846-1946

GEORGE ROSEN*

1846 — Bernard DeVoto has called 1846 a *year of decision* in relation to the history of the United States. As concerns the history of Medicine, it may more accurately be called a *year of transition.* It was a year in which new ideas and new methods burst forth, and yet in many ways it was still dominated by the past. 1846 saw the announcement of ether anesthesia in America, and the discovery by Claude Bernard, in France, of the role played by pancreatic juice in digestion. In Boston, there appeared in 1846 a *Report to the Committee of the City Council Appointed to Obtain the Census of Boston for the Year 1845* . . . by Lemuel Shattuck, a publisher, who thus set out to become the first public health statesman in America. And in Germany, Jacob Henle issued the second edition of the first volume of his *Handbuch der rationellen Pathologie,* which had first appeared only the year before. Yet while Henle issued forth under the challenging slogan of "rational medicine" to attack the forces of error and reaction, in Bavaria the all-powerful Johann Nepomuk von Ringseis, who saw disease as the consequence of man's original sin, forced medicine to subordinate itself to theosophy. In 1846, in London, John Elliotson, protagonist of mesmerism, delivered the Harveian Oration, in which he gave a dignified and eloquent presentation and defense of his views. For this, he was roundly and savagely denounced by Thomas Wakley, editor of the *Lancet.* Peculiarly appropriate, therefore was the appearance in 1846 of a journal devoted to the history of medicine, and bearing the title *Janus.*

Periodicals devoted to the history of medicine had already appeared in the eighteenth century. In 1790, Philipp Ludwig Wittwer (1752–1792) published at Nürnberg the first and only number of his *Archiv für Geschichte der Arzneykunde in ihrem ganzen Umfange.* Several years later, Kurt Sprengel (1766–1833), the historian, issued two volumes of *Beiträge zur Geschichte der Arzneiwissenschaft* (Halle 1794–96). These

* Editor of the JOURNAL.

*Editor's Note:* This is the first of a series of essays on the history and theory of medical history. These will appear at intervals, and will indicate the background against which medical history as we know it must be viewed.

early efforts were so short-lived, however, that *Janus* may be said to have been the first modern periodical devoted to medical history that continued in existence for any considerable length of time. (Five volumes were published between 1846 and 1853.) Noteworthy, also, is the spirit of scientific internationalism and scholarship which characterized the journal from its very inception.

The editor of *Janus* was August Wilhelm Eduard Theodor Henschel (1790–1856), professor of clinical medicine at Breslau, well-known for his excellent studies on the history of medicine in Silesia during the Middle Ages, and for his discovery, in the library of the Breslau *Gymnasium,* of a *Compendium Salernitanum* dating from the latter part of the twelfth century, which awakened an intense interest in the ancient *Civitas Hippocratica.* The journal was first announced in 1845 by a prospectus, which indicated that Henschel would have as associate editors a number of eminent medical historians, among them Ludwig Choulant (1791–1861), Heinrich Haeser (1811–1885), J. F. C. Hecker (1795–1850), and Julius Rosenbaum (1807–1874). The appearance of the first issue more than fulfilled this promise. Associated with Henschel were not only the leading German medical historians, but also many distinguished foreign scholars. For the period it was a truly international group. De Balzac, Daremberg, Littré, Pétrequin, Renouard, and Saucerotte represented France; Greenhill, England; and Bussemaker, Ermerins, and Israels represented Holland. In addition to the Germans mentioned above, the following also appeared on the title page of the first volume as associate editors: C. G. Carus, H. Damerou, C. H. Fuchs, A. Göschen, C. F. Heusinger, F. Jahn, K. J. H. Marx, Fr. Nasse, J. F. Osiander, E. A. Quitzmann, J. Sichel, E. C. J. von Siebold, J. G. Thierfelder, and F. W. Wüstenfeld.

According to the prospectus, Henschel envisioned *Janus* as providing a medium of publication for original contributions dealing with various periods in the development of medicine, with the history of diseases, therapy, medical geography, professional organization, and medical legislation. In addition, it would contain sketches and biographical accounts of outstanding physicians, important historical texts and documents, reports on current devolopments of interest to doctors, such as accounts of new discoveries and inventions, as well as statistical communications on existing medical conditions, and reviews of important medico-historical publications. Truly, an impressive program!

When *Janus* first appeared in 1846, it was published at Breslau. Two further volumes appeared there in 1847 and 1848, but thereafter publication was suspended. In 1851, however, *Janus* reappeared at Gotha in a slightly different guise. The journal was now under the joint editorship of four men: H. Bretschneider, A. W. E. T. Henschel, C. F. Heusinger, and J. G. Thierfelder; and bore the subtitle: *Magazine for the History and Literature of Medicine, Medical Biography, Epidemiography, Medical Geography, and Statistics.* Despite the perseverance of Henschel, the moving spirit of the journal, *Janus* was not destined to enjoy a long life. With the publication of another volume in 1853, it ceased to exist and became a subject for historical study.

The failure of *Janus* to take root and flourish may be attributed to the lack of sympathy and interest with which it was received by the medical profession. This lack of interest was probably the result of two related trends in German medicine. It was a period when German medicine, having turned away from the mystical speculations of Romantic philosophy, was not likely to look with favor on anything that hinted at such a connection. Among the associate editors of *Janus* were a number of adherents of the Romantic school in medicine: Carl Gustav Carus, Heinrich Damerou, Ferdinand Jahn, J. M. Leupold, and E. A. Quitzmann; and this circumstance may have led progressive doctors to regard *Janus* as representing a reactionary tendency. Connected with this trend was the attitude, particularly widespread among the younger men, to turn away from the past, and to look to the present for inspiration. The times were pregnant with discovery, and the possibilities seemed unlimited. In 1846, Virchow became prosector at the Charité, and Traube started the *Beiträge zur experimentellen Pathologie,* which printed some of Virchow's famous work on embolism and thrombosis. A year later (1847), Virchow and his friend Reinhardt launched their *Archiv für pathologische Anatomie und Physiologie und für klinische Medizin.* In 1851, Helmholtz discovered the ophthalmoscope, and Claude Bernard reported his first experiments on the vasomotor nerves. Henschel was aware of these trends, particularly the latter. In an introductory article (to the 1851 volume), entitled "Is Medical History Timely?", he says: "When doctors, especially those of the most recent school, withdraw from the older medico-historical studies, it is likewise very understandable, and indisputably has a deeper significance related to the great intellectual movements of our time. Our period is unmistakably engaged in a total, vital process of regeneration; and

many promising paths of research have been discovered which are being followed with devotion and success. . . ."

Despite its relatively short life, however, the achievement of *Janus* was substantial. As Karl Sudhoff pointed out, "old Janus" is still being used constantly as an indispensable tool by students of medical history. Henschel's papers on the Salernitan manuscript are still basic for a knowledge of the school of Salerno; and similarly significant are the articles by Wüstenfeld on Moslem medicine, and Heusinger on the history of epidemics.

Another interesting feature is the attention given to medical geography. Several contributions on this subject appeared in the first volume: "The disease described by English Physicians in East India under the name 'Burning of the feet,' " and "The 'Cak' in Sennaar, an epidemic disease, probably comparable to maize-pellagra," both by Heusinger. In later volumes appeared articles on the folk-medicine of Ceylon, and on the "distribution of diseases in a vertical direction from the North Sea coast to the ridge of the Thuringian forest." The latter contribution was by C. H. Fuchs, author of a *Medicinische Geographie* that appeared in 1853, and represents a type of epidemiological thinking which was prevalent in the pre-bacteriologic period of the nineteenth century. His work was severely criticized in *Schmidt's Jahrbücher* (78 [1853] 355–73) by August Hirsch, who in 1860 published his classic *Handbuch der historisch-geographischen Pathologie.*

The *exitus* of *Janus* was a severe blow, and it was not until 1878 that a new journal of medical history appeared.This was the *Deutsches Archiv für Geschichte der Medicin und medicinische Geographie,*[1] edited by the brothers Heinrich and Gerhard Rohlfs.

Fifty years after the appearance of the original *Janus,* in 1896, a new journal bearing the same name was founded in Holland. This journal for the history of medicine and medical geography was more successful, however, than its earlier namesake and enjoyed a long life. In 1929, the William H. Welch Medical Library was opened in Baltimore, and *Janus,* quick to sense the historic importance of the occasion, appeared once again on the stage of medical history. In honor of Dr. Welch, the five volumes of the original *Janus* were reproduced in facsimile, and issued under the editorship of Karl Sudhoff.

Viewed retrospectively from the vantage point of 1946, the pioneer

[1] This Journal will be discussed in a subsequent paper.

effort of Henschel and his collaborators deserves to be recognized as an important milestone in the development of medical history. At the same time, however, it also teaches the historian of medicine an important lesson, namely, that medical history cannot remain wholly in the past, if it is to have any meaning for the physician of the present. The medical historian, who remains intellectually isolated from the present, will fail to perform a very important function — he will fail to bridge the gap between the past and the present, and thus in large measure vitiate his own labors.

# Dr. Thomas Bond's Essay on the Utility of Clinical Lectures

CARL BRIDENBAUGH*

AMONG many sociologists and historians it has become an accepted axiom that Eighteenth-Century America suffered from the "cultural lag" which is commonly observed in all colonies when their achievements are compared with those of older, established societies. Upon close examination, however, there appears considerable doubt of the validity of this sweeping generalization. For example, the cultural flowering of Philadelphia, 1740–1776, placed it not on the periphery but squarely in the center of the Enlightenment.[1] In this second city of the British Empire there was often no "lag" at all, for in such activities as electrical research, organized philanthropy, prison reform, and scientific publications, Philadelphians set the pace for Europeans to follow — and were recognized by European savants as so doing.

By 1750, Philadelphia medical men, with ideas of their own and thoroughly cognizant of current European developments, began energetically to provide their community with the best possible facilities for the prevention and cure of disease by promoting legislation for the cleaning and paving of streets and the draining of swamps, by founding the Pennsylvania Hospital (1751), by establishing a Medical School at the College (1765), and by founding a Medical Society (1766). The towering figure in this noteworthy advance was Dr. Thomas Bond, who as philanthropist, physician, surgeon, and organizer of medical and scientific activities proved himself the outstanding member of the faculty in the thirteen colonies.

Although Giovanni Battista Morgagni of Padua had published his *Seats and Causes of Disease,* which established the study of pathological anatomy, as recently as 1761, Dr. Bond was ready by 1766 to add lectures at the Pennsylvania Hospital on this new and fundamental subject to the theoretical instruction provided by Doctors Morgan and Shippen at the

* Institute of Early American History and Culture, Williamsburg, Virginia.

[1] This thesis is developed in detail by Carl and Jessica Bridenbaugh in *Rebels and Gentlemen: Philadelphia in the Age of Franklin* (New York 1942).

Medical School.[2] To the Sitting Managers of the Hospital Dr. Bond addressed a letter in which he proposed that "they would give Liberty and Encouragement for the Reading Clinical Lectures, to the Students in Physic, on the Nature, Cause and Cure of Diseases, and to put up a Meteorological Apparatus in the Picture Room, for observation of the Weather, and keeping an Exact Account of the Epidemic Diseases thereby caused." The Board was agreeable and designated December 11, 1766, as the day upon which it would assemble to listen to "the plan intended to be prosecuted by the Physicians of the Hospital."

This lecture, delivered at Dr. Bond's home before an enthusiastic audience composed of the Managers of the Hospital, professors of the College, leading physicians of the city and "near thirty Students," ranks with Dr. Morgan's *Discourse upon the Institution of Medical Schools in America* (1765) as one of the early classics of American medical literature. It sets forth a point of view which was ignored between the Revolution and the Civil War, but which today is recognized as valid.[3] Largely overlooked by students of our medical history, it has been twice printed in publications now generally inaccessible: the *North American Medical and Surgical Journal* 4 (1827) 264–75; and in the appendix of T. G. Morton and F. Woodbury, *The History of the Pennsylvania Hospital* (Philadelphia 1897). The text here produced is taken from the Minutes of the Managers of the Pennsylvania Hospital (pp. 277–289), from whom, through the good offices of Miss Florence Greim, permission has been generously granted for publication. In the interest of clarity a few minor changes have been made in punctuation and spelling.

## Doctor Thomas Bond's Introductory Lecture to a Course of Clinical Observations in the Pennsylvania Hospital, Delivered There December the 3rd 1766

When I consider the unskilful hands the Practice of Physic and Surgery has of necessity been Committed to, in many Parts of America, it gives me pleasure to behold so many Worthy Young Men, training up in those professions, which, from the nature of their Objects, are the most interesting to the Community, and yet a greater pleasure in foreseeing, that the unparalled public Spirit, of the Good

[2] Dr. John Morgan, founder of the Medical School, had met Morgagni and had been presented with an autographed set of his works (which is now in the Library of the College of Physicians, Philadelphia). He does not, however, appear to have conceived of the need for clinical lectures in connection with his school.

[3] See Richard H. Shryock, "Factors Affecting Medical Research in the United States, 1800–1900," *Bulletin of the Society of Medical History of Chicago* 5(1943) 1-5. For the medical scene in Philadelphia at the time of the delivery of Dr. Bond's lecture, consult Bridenbaugh, *Rebels and Gentlemen*, Chapter VIII.

People of this Province, will shortly make Philadelphia the Athens of America, and Render the Sons of Pennsylvania, reputable amongst the most celebrated Europeans, in all the liberal Arts and Sciences. This I am at present Certain of, that the institutions of Literature and Charity,[4] already founded, and the School of Physic lately open'd in this City[5] afford sufficient Foundation for the students of Physic to acquire all the Knowledge necessary for their practising every Branch of their professions, reputably, and Judiciously.

The great Expence in going from America, to England, and thence from Country to Country, and Colledge to Colledge, in Quest of Medical Qualifications, is often a Barr to the cultivation of the Brightest Geniuses amongst us, who might otherwise be Morning Stars in their professions, and most useful Members of Society.[6] Besides every Climate produces Diseases peculiar to itself, which require experience to understand and cure; and even the Diseases of the several Seasons in the Same Country, are found to differ so much some Years, from what they were in others, that Sydenham, the most Sagacious Physician that ever lived, acknowledges that he was often difficulted and much mistaken in the treatment of Epidemic's for some time after their appearance.

No Country then can be so proper for the instruction of Youth in the knowledge of Physic, as that in which 'tis to be practised; where the precepts of never failing Experience are handed down from Father to Son, from Tutor to Pupil.

That this is not a Speculative opinion, but real Matter of Fact, may be proven from the Savages of America, who without the assistance of Literature have been found possessed of Skill in the cure of Diseases incident to their climate, Superior to the Regular bred, and most learned Physicians, and that from their discoveries the present practice of Physic has been enrich'd with some of the most valuable Medicines now in use.

Therefore from Principles of Patriotism and Humanity, the Physic school here, should meet all the protection and Encouragement, the Friends of their Country, and Well Wishers of Mankind can possibly give it. Though 'tis yet in its Infancy from the Judicious Treatment of it's Guardians, it is already become A forward Child, and has the promising appearance of soon arriving to a Vigorous and Healthful Maturity. The professors in it at present are few; but their departments include the most Essential parts of Education; Another, whose distinguish'd Abilities will do honour to his Country and the Institution, is Expected to join them in

[4] Dr. Bond doubtless had in mind the Library Company and the College of Philadelphia in which he, personally, had taken an active part. The cultural life of Philadelphia is discussed against its provincial and European backgrounds in Bridenbaugh, *Rebels and Gentlemen.*

[5] During commencement, May 30-31, 1765, Dr. John Morgan delivered before the College audience, in two parts, his notable *Discourse upon the Institution of Medical Schools in America* (Philadelphia 1765; reprinted in *Bibliotheca Medica Americana* 2 [Baltimore 1937]), and in September came the joint announcement of Dr. Morgan's lectures on Materia Medica and those of Dr. William Shippen on anatomy and surgery. *Pennsylvania Gazette,* Sept. 26, 1765.

[6] Not only did the cost of a European education confine medical training to the upper class, it was dangerous. At least two young medical students lost their lives in the Atlantic crossing. Bridenbaugh, *op. cit.* 276-78.

the Spring,[7] And I think he has little Faith who can doubt that so good an undertaking will ever fail of Additional Strength, and a Providential Blessing. And I am certain nothing woud give me so much pleasure, as to have it in my Power to contribute the least mite towards it's perfect Establishment.

The Professor of anatomy and Physiology,[8] is well qualified for the Task; his Dissections are accurate and Elegant, and his Lectures, Learned, Judicious, and Clear.

The Professor of the Theory and Practice of Physic,[9] has had the best opportunities of improvement, join'd to Genious and application, and cannot fail of giving Necessary and instructive Lessons to the Pupils.

The Field this gentleman undertakes is very Extensive, and has many difficulties which may mislead the Footsteps of an uncautioned Traveller, therefore Lectures, in which the different parts of the Theory and Practice of Physic are Judiciously Classed and Systematically explain'd, will prevent many Perplexities the student would otherwise be Embarrassed with, will unfold the Doors of Knowledge, and be of great use in directing and abridging his future Studies, Yet there is something further wanting, he must Join Examples with Study, before he can be sufficiently qualified to prescribe for the Sick; for Language and Books alone, can never give him Adequate Ideas of Diseases, and the best methods of Treating them. For which reasons Infirmaries are Justly reputed the Grand Theatres of Medical Knowledge.

There the Clinical professor[10] comes into the Aid of Speculation and demonstrates the Truth of Theory by Facts: he meets his Pupils at stated times in the Hospital, and when a case presents adapted to his purpose, he asks all those Questions which lead to a certain knowledge of the Disease, and parts affected; this he does in the most exact and particular manner, to convince the Students how many, and what minute circumstances are often necessary to form a judgment of the curative indications, on which, the safety and Life of the Patient depend, from all which Circumstances and the present Symptoms, he pronounces what the Disease is, whether it is curable or Incurable, in what manner it ought to be treated, and gives his reasons from Authority or Experience for all he says on the occasion; and if the Disease baffles the power of Art, and the Patient falls a sacrifice to it, he then brings his knowledge to the Test, and fixes Honour or discredit on his Reputation by exposing all the Morbid parts to view,

[7] Dr. Adam Kuhn, armed with an Edinburgh degree, returned from botanical study with Linnaeus to become Professor of Materia Medica in January, 1768. Bridenbaugh, *op. cit.* 291; *Pennsylvania Journal,* May 5, 1768.

[8] Dr. William Shippen, also an Edinburgh graduate with additional training in surgery at London under Dr. William Hewson and the Hunters, began his courses in anatomy under the sponsorship of the Pennsylvania Hospital in 1762 and continued them until 1765, when he became a professor in the Medical School. *Pennsylvania Gazette,* Nov. 11, 1762.

[9] Dr. John Morgan "graduated at Edinburgh with an éclat almost unknown before," and came home after the Grand Tour "flushed with honors"— Fellow of the Royal Society, Corresponding Member of the Royal Academy of Surgery at Paris, Licentiate of the Royal College of Physicians in London as well as in that of Edinburgh. *Pennsylvania Magazine of History and Biography,* 18 (1894) 37, 40; *Pennsylvania Gazette,* Oct. 3, 1765; Dec. 8, 1766.

[10] Here Dr. Bond refers to the clinical lectures he proposes to give.

and Demonstrates by what means it produced Death; and if perchance he finds something unsuspected, which betrays an Error in Judgment, he like a great and good Man, immediately acknowledges the mistake, and for the benefit of survivors points out other methods by which it might have been more hapily Treated. The latter part of this field of Tuition is the surest method of obtaining just Ideas of Diseases. The great Booerhave[11] was so attentive to it, that he was not only present at the opening of Human Bodies, but frequently attended the Slaughter Houses in Leyden, to examine the Carcases of Beasts; and being asked by a learn'd Friend, by what means he had acquired such uncommon certainty in the Diagnostic's and Prognostic's of Diseases, answered by examining dead Bodies, studying Sydenhams observations, and Bonetus's *Sepulchretum Anatomicum,* both which he had read ten times, and each time with greater pleasure, and improvement.[12]

But to give you more familiar instances of the utility of this practice, let me remind several of You, who were present last Fall at the opening two Bodies,[13] One of which died of Astmatic complaints, the other of a Phrenzy succeeded by a Palsey, and ask you whether any thing short of occular demonstration, cou'd have given you just Ideas of the causes of the Patients Death, in one we saw a Dropsy in the left side of the Thorax, and a curious Polypus with its growing Fimbriae of 14 Inches in length (now in the Hospital) extending from the left Ventricle of the Heart, far beyond the Bifurcation of the pulmonary Artery, in the other we found the Brain partly superated and the Ventricle on the opposite side to that affected, with the Paralysis, distended by a large Quantity of Limpid Serum; and you must Remember, that the state of all the Morbid parts were predicted, before they were exposed to View: which may have a further advantage, by rousing in you an industrious pursuit after the most hidden causes of all the affections of the Human Body; and convince you what injury they do to the living, who oppose a decent, painless, and well timed examination of the Dead.

Thus all the professors in the best European Colledges,[14] go hand in hand, and co-operate with each other by regular chains of Reasoning and occasional demonstrations, to the satisfaction and improvement of the Students.

But more is required of us in this late settled world, where new Diseases often occurr, and others common to many parts of Europe visit us too frequently, which it behoves the Guardians of Health, to be very watchful of, that they may know them well, and by an hearty union, and Brotherly communication of observations investigate their causes, and check their progress. The Task is Arduous, but 'tis a Debt we owe to our Friends and our Country. The Atmosphere that Surrounds

[11] Herman Boerhaave of Leyden, under whom several Philadelphians had studied. His influence was strong in Edinburgh too. See Richard H. Shryock, *The Development of Modern Medicine* (Philadelphia 1936) 67-68.

[12] For Thomas Sydenham, the great English clinician, see David Riesman, *Thomas Sydenham* (New York 1926); and on the somewhat uncritical pathological observations of Théophile Bonet, consult Shryock, *op. cit.* 63-64.

[13] Probably the bodies of patients who died either at the Pennsylvania Hospital or at the Bettering House. In 1764 Dr. Shippen had dissected the body of a Negro suicide before students in his "theatre." *Pennsylvania Gazette,* Apr. 12, 1764.

[14] This was true of Continental medical schools, rather than of those in the British Isles.

us is fine, and the Air we breath, free, pure, and Naturally healthy, and I am fully perswaded we shall find on strict enquiry, when it becomes otherwise, 'tis mostly from contagion imported, or neglected Sources of Putrifaction, amongst ourselves, and therefore when ever we are able to Demonstrate the Causes, they may be removed and the Effects prevented.

Our Fathers after insuring to us the full enjoyment of the inestimable blessings of Religious and Civil Liberty, have settled us in a Country that affords all the real comforts of life, and given us the prospect of becoming one Day, a great and happy People, and I know only one Objection to a prudent Mans giving North America the preference to any other part of the British Dominions for the place of his residence, which is, that the climate is sometimes productive to severe Epidemic Diseases in the Summer and Fall:[15] the Country is otherwise free from those tedious and dangerous Fevers which frequently infest most parts of Europe. The last wet Summer and a short space of hot dry Weather in Autumn, caused so many Intermittents from the Southern Suburbs of this City all the way to Georgia, that I may venture to assert two thirds of the inhabitants were not able to do the least Business for many Weeks, and some families and even Townships were so distress'd that they had not well persons sufficient to attend the Sick, during which time this City was unusually Healthy. How respectable then wou'd be the Characters of those Men, who shou'd wipe this Stain out of the American Escutcheon and rescue their Country from such frequent calamaties.

Sufficient encouragement to make the attempt is found both in History, the Books of Physic, and our own Experience. Several instances are recorded of places that were so sickly, as to be uninhabitable, until Princes have ordered their Physicians to search into the causes of their Unhealthiness, and having discover'd and removed them, made thereby valuable additions to their Kingdoms. Was not our Antient and Great Master, Hippocrates, so knowing in the cause of Pestilential Contagion, as to foresee an approaching Plague, and send his pupils into the cities to take care of the Sick, and has not *He,* and Sydenham the English Hippocrates, done infinite Service to the healing Art, and gained immortal Honours to themselves, by their Essays on Epidemic's in which they not only accurately describe the Diseases of their Respective Countries, but shew the depraved constitution of the Air which produced each of them. Our own Experience also affords much Encouragement, when I first came into this City the Dock[16] was the common Sewer of Filth, and was such a Nuisance to the inhabitants about it, every Fall, that they were obliged to us more pounds of Bark,[17] than they have Ounces since

[15] Physicians of Philadelphia and of the Southern Colonies spent much time in the study of the causes and cure of "Fevers." The most significant work on this subject was *An Essay on Fevers,* by Dr. Lionel Chalmers of Charleston, S. C., which ran serially in the *Pennsylvania Chronicle* (Dec. 19, 1768-Jan. 2, 1769) through the good offices of Dr. Morgan and the American Society for Promoting Useful Knowledge. It was published in book form in Philadelphia in 1769 and at London in 1776.

[16] For years the "Dock" had been a receptacle for dead dogs, carrion and filth — "a publick nuisance injurious to health." In 1763 the authorities ordered it filled in to form the present Dock Street. *Statutes at Large of Pennsylvania* (Vols. 2-13 Harrisburg 1896–1908) 5. 234-836.

[17] In colonial days quinine was commonly called Jesuit Bark or Catholic Bark.

it has been raised, and levell'd. Another striking instance of the Advantage of Cleanliness for the preservation of Health, affords me an Opportunity of paying a Tribute, justly due, to the Wisdom of the Legislature of this Province, in framing the salutary Laws for paving and regulating the Streets of this City,[18] and to the indefatigable industry and Skill of the Commissioners in excuting them, whereby they have contributed so much to the Healthiness of the Inhabitants, that I am confident the whole Expence will be repair'd in ten Years, by the lessening of Physic Bills alone. A Farm within A few miles of this city was remarkably healthy for Fifty Years, whilst the Tide overflow'd the Low Lands, near the dwelling House, but after they were Bank'd in by Ditches so ill contrived that they often did not discharge the Water that fell into them for considerable time, and until it became putrid, and thereby rendered the place as remarkably Sickly, as it had before been healthy, I was told by a Gentleman of Veracity that he saw the Corps of One of Nine tenants that had been carried from it in a few Years.

The Yellow Fever, which I take to be exactly the same distemper as the Plague of Athens, described by Thucydides, has been five different times in this City since my residence in it, the causes of three of them I was luckly able to Trace, and am certain they were the same, which produced a Goal Fever in other Places, and am of opinion the difference betwixt the appearance of these Fevers, arises from the Climate, and the different state the Bodies are in when they Imbibe the Contagion; if so, the Same methods which are taken to prevent a Goal Fever, will equally prevent a Yellow Fever; 'Twas in the Year Forty One,[19] I first saw that horrid Disease which was then imported by a Number of Convicts from the Dublin Goal. (The second time it prevailed it was indigenous from Evident causes, and was principally confined to One Square of the City.) The third time it was generated on Board of Crowded Ships in the Port, which brought in their Passengers in Health, but soon after became very Sickly. I here saw the appearance of Contagion like a Dim Spark which gradually encreased to a Blaze, and soon after burst out into a terrible Flame, carrying Devastation with it, and after continuing two Months was extinguish'd by the profuse Sweats of Tertian Fevers, but this is not the ordinary course of the Contagion, 'tis usually check'd by the cool Evenings in September and dies on the Appearance of an October Frost.

I lately visited an Irish Passenger Vessel, which brought the People perfectly healthy untill they came in our River. I found five of them Ill, and others Unwell, and saw that the Fomes[20] of infection was spreading among them, I therefore ordered the Ship to lay Quarantine, to be well purified with the Steams of Sulphur,

[18] As a result of an aroused public opinion, agitated for years by the pressure of such citizens as Dr. Bond and Benjamin Franklin, the Assembly finally passed a law in 1762 providing for the paving and cleansing of Philadelphia's streets, and appointed Commissioners to carry out the program. The Commissioners' Minutes, 1762–1768, are in the Historical Society of Pennsylvania. 1750/1; Apr. 15, 1762; *Statutes at Large of Pennsylvania* 6. 196-214; 230-846.

[19] So many Palatines arrived with malignant fevers in 1741 that their plight aroused public interest and resulted in 1743 in the establishment of an isolation hospital on a 342 acre tract on Province Island. *Statutes at Large of Pennsylvania* 4. 382.

[20] Foams. Dr. Bond was one of the Port Physicians at this time who were employed by the Province to examine immigrant vessels. See his report on sick Palatines made with Dr. Thomas Graeme in 1754. *Pennsylvania Magazine of History and Biography* 36(1912) 476.

and with Vinegar, directed the Bedding and Cloathing of the People to be well wash'd and Air'd, before any person should be permitted to Land out of her, after which I advised separating the Sick from the Healthy. This was done by putting twelve in different Rooms in one House, and fourteen in another, out of the City, the conveniences of the two Houses were much the same, in one of them little care was taken of the Sick, who were laid upon the same foul beds, they (contrary to orders) brought on Shore with them; the consequence was, that all the Family catch'd the distemper, and the Landlord Died. In the other my directions were Strictly observed, the Sick had clean Cloaths, and clean Bedding, were well attended and soon Recovered, without doing the least Injury to any person that visited them; which confirms Observations I had often made before, that the Contagion of Malignant Fevers, lies in the Air confined and corrupted, by a neglect of Rags and other filth about the Helpless Sick, and not from their Bodies.

As each of these heads, shall be a Subject of a future Lecture, I shall at present only mention to you further, a few of those Methods which have preserved Individuals from prevailing diseases.

The inhabitants of Hispaniola have found the wearing Flannel Shirts to be a preservative against Intermitting Fevers in that sickly Island, and as that Disease is known to arise principally from inhaling a great Quantity of the Humidity of the Air, I make no doubt 'twould also be of use in preventing them in our low, moist, level Countries.

We know that the Bark of Sassafras contains many Excellent Medicinal Virtues, my Worthy Friend Mr. Peter Franklin[21] told me that he being in the Fall of the Year, in the River Nantikoke in Maryland, and on seeing the People on Shore much afflicted with Intermitting Fevers, advised the Marriners of the Ship to drink freely, by way of prevention, of that Aromatic and Antiseptic Medicine, but cou'd not prevail on more than half the company to do it, and that he and all the others who took it, enjoy'd perfect Health, whilst not a single Person of the rest, escaped a severe attack of the Epedemic Disease, I have known other similar Instances, which 'tis needless to mention, since this is remarkably pertinent.

But I have many reasons to expect that a more agreeable, and equally certain preventative against our Autumnal Fevers, will be found in Sulphures Chalybeate Waters, which may readily be procured in most parts of America, especially where those Diseases are most prevalent, A Spring of this Kind at Gloucester[22] within a few Miles of this Place has been much used of late, and has been so very serviceable to Invalids, it has the appearance of being a valuable conveniency to the City, Persons under various Diseases took Lodgings in the Village the

[21] Peter Franklin, post-master of Philadelphia and brother of Benjamin Franklin, had died several months before Dr. Bond's lecture, in July, 1766. Carl Van Doren, *Franklin* (New York 1938) 212, 261, 358.

[22] Each of Philadelphia's physicians appears to have had his favorite mineral spring. Water from the Gloucester spring was bottled over in New Jersey for sale in the city. Carl Bridenbaugh, "The Baths and Watering Places of Colonial America," *William and Mary Quarterly*, 3rd. ser., 3 (1946) 173-74, 177.

last Season, for the advantage of drinking the Waters at the Fountain head, and though the Fall was more sickly than has been known in the Memory of Man, not one, who went there for health, nor any one of the Inhabitants near the Spaw, who drank it freely, had a touch of the prevailing Disease, whilst a Major part of those that did not, had more the appearance of Ghosts, than living Creatures, there were two Houses, the Habitations of Father and Son, within twenty Feet of each other, the Family of the Father had suffered greatly from Intermitting Fevers the preceding Fall, and some of them continued Invalids 'till the middle of Summer, when they were prevailed on, to take the Waters, after which they daily recovered Health, Bloom, and Vigour, and pass'd the sickly Season without a Complaint, whilst scarcely a person in that of the Son, who did not take them, escaped a severe Illness; 'Tis well known from experience that Mineral Waters are not only the most Palatable, but the most Salutary parts of the Materia Medica, and that the Effect of those which are pure and properly impregnated with chalybeate Principles, Strengthen digestion, brace and counteract the Summers Sun, dilute a thick putrid Bile, (the instrument of Mischief in all Hot Climates) and immediately wash away putrification through the Emuntaries of the Bowels, Skin, or Kidneys, and therefore appear to be natural preservatives against the Effect of an hot, moist, and putrid atmosphere. Whether these Waters will answer my sanguine Expectations or not, must be left to the Decision of Time. If they should be found wanting, that ought not discourage our further pursuit, for since providence has furnish'd every Country with defences for the Human Bodies, against the inclemencies of Heat and Cold, why shou'd we Question whether infinite wisdom and Goodness has made equal Provision against all other natural injuries of our Constitutions; Experience and Reason, encourages us to believe it has, and that the means might be discovered by diligent investigation were our researches equal to the Task, the above instances are therefore related to convince you, that the prevention of some of the Epedemic diseases of America is not only a laudable and rational Pursuit, but is more within the limits of human precaution than has generally been imagined, and to excite your particular attention to the improvement of this Humane and interesting part of your profession, in which, and all other useful undertakings, I most sincerely wish you Success.

I am now to inform you, Gentlemen, that the Managers and Physicians of the Pennsylvania Hospital, on seeing the great number of you attending the School of Physic in this City, are of opinion, this excellent institution likewise affords a favourable opportunity of farther improvement to you in the practical part of your Profession, and being desirous it should answer all the good purposes intended by the generous Contributors to it, have allotted to me the Task of giving a course of Clinical, and Meteriological Observations in it, which I chearfully undertake (though the season of my Life points out relaxation and retirement, rather than new Incumbrances.[23]) in hopes, that remarks on the many curious Cases that must daily occurr, amongst an Hundred and thirty Sick persons, collected together at one time, may be very instructive to You. I therefore purpose

[23] Dr. Bond was at this time fifty-four years of age.

to meet you at stated times here, and give you the best information in my Power of the nature and treatment of Chronical Diseases, and of the proper management of Ulcers, Wounds and Fractures. I shall shew you all the Opperations of Surgery, and endeavour, from the Experience of Thirty Years, to introduce you to a Familiar acquaintance with the acute Diseases of your own Country, in order to which, I shall put up a compleat Meteriological Apparatus, and endeavour to inform you of all the known Properties of the atmosphere which surrounds us, and the effects it's frequent variations produce on Animal Bodies, and confirm the Doctrine, by an Exact register of the Weather, and of the prevailing Diseases, both here, and in the Neighbouring Provinces, to which I shall add, all the interesting observations which may occurr in private practice, and sincerely wish it may be in my power to do them to your Satisfaction.

I likewise have the Pleasure to inform you, that Doctor Smith,[24] has promised to go through a course of experimental Philosophy in the Colledge, for your instruction in Pneumatic's, Hydraulic's, and Mechanic's, which will be of the greatest advantage to a ready comprehension of the Meteriological Lectures, and other parts of your Medicinal Studies, and lay you under the highest obligations to that learned Professor.

[24] The Reverend William Smith, D.D., Provost of the College of Philadelphia. For his lectures, see *Pennsylvania Gazette*, Dec. 11, 1766; Aug. 24, 1769.

# The Doctor and the Newspaper in the Territory of Michigan, 1817-1837

FANNY J. ANDERSON

LEWIS CASS was appointed governor of the Territory of Michigan in 1813, and it was largely due to his vision and enterprise that within a decade, a region prostrated by war, was able to look forward to a future of achievement and prosperity. Military roads leading from Detroit soon pierced the interior. Improvement in water transportation facilitated migration from New England and New York to the West. The "Walk-in-the-Water," first steamboat on the Great Lakes, began to carry passengers to Detroit from Buffalo in 1818, and the Erie Canal was opened in 1825.

In 1826, Monroe reported that the population of that village had increased one-third in less than a year, and included one printer, one capitalist, one physician, one tailor, two blacksmiths, four house carpenters, one cooper, one carriage and sleigh maker, one fanning-mill maker, and a considerable number of laborers. A tinman, a hatter, and a gold and silver smith were still wanted. "The village also contains a grist mill with three runs of stones and a sawmill."[1]

By September 1837, the *Constantine Republican* could announce "To Emigrants and Travellers,"

> The Erie and Kalamazoo Railroad is now in full operation between Toledo and Adrian. During the ensuing season, trains of cars will run daily to Adrian, there connecting with a line of stages for the West, Michigan City, Chicago, and the Wisconsin Territory.[2]

Settlers, especially from New York, were rapidly taking up land which had recently been acquired from the Indians by treaty with the national government. These easterners were quick to transplant institutions to which they were accustomed. Towns and villages sprang up along every highway to serve as social and economic centers.

On June 14, 1819, the Governor and Judges of the Territory deemed it necessary to pass "An Act to incorporate medical societies for the purpose of regulating the practice of Physic and Surgery in the Territory of Michigan." This act was adopted from the laws of the State of New York, and placed certain powers in the hands of the Territorial Society; namely, the power to charter county societies, to examine students, and to grant diplomas to practice medicine within the Territory. Fines were

[1] *Michigan Herald*, Detroit, April 26, 1826.

[2] *Constantine Republican*, September 13, 1837.

imposed as a penalty for infraction of the law, as well as inability to collect in any court in the Territory payments due from illegal practice.[3] On June 23 and June 30, 1820, the *Detroit Gazette* printed the following notice:

> For the information of the public, you are requested to state in your paper, that in conformity to a law regulating the Practice of Physic and Surgery, and for other purposes, a Medical Society has been some time organized in this territory, which promises much future usefulness in prohibiting quackery, in this most important of all professions to the lives and health of our citizens.
>
> The following is a list of the officers and members of the "Medical Society of Michigan," to wit:
>
> Doct. William Brown, President
> " Stephen C. Henry, Vice President
> " John L. Whiting, Secretary
> " Randall S. Rice, Treasurer
> " Ebenezer Hurd
> " William Thompson
> " Henry Conant
>
> Docts. Hurd, Henry and Rice are the censors, or Committee of examination for the current year.

In accordance with the Act, branch societies were chartered in Washtenaw County (June 12, 1827), Oakland County (June 28, 1831), St. Joseph County (June 4, 1835), Macomb County (January 8, 1836), and in Branch County (June 13, 1837).[4] A society for Wayne County was not organized until 1849.[5]

Not all licentiates were members of the Society, since a majority of votes of the membership was necessary. During the territorial period about two hundred physicians were licensed to practice by the parent society, of which 46 were members and two honorary members. The exact number including those licensed by branch societies can not be determined. From 1819 to 1830, the minutes and records of the parent society were carefully entered and credentials of each candidate noted, but interest, after that date, waned quite evidently, the meetings were fre-

[3] *Laws and Ordinances of the Medical Society of the Territory of Michigan, 1819-51,* Manuscript, Medical Science Department, Detroit Public Library; *Detroit Gazette,* August 13, 1819.

[4] Meeting of Washtenaw Medical Society, *Emigrant,* Ann Arbor, December 28, 1831; *Michigan Whig,* Ann Arbor, January 15, 1835. Physicians of Oakland County called to meet at Pontiac, May 14, 1831, to form a County Society, and Macomb Physicians invited to attend, *Democratic Free Press,* Detroit, May 12, 1831. Annual meeting of St. Joseph County called at White Pigeon, *Constantine Republican,* January 25, March 1, 1837.

[5] Wayne County Medical Society, *Record Book, 1849-51,* Manuscript, Burton Historical Collection, Detroit Public Library.

quently adjourned, because a quorum was not present, and, towards the end of its existence (1851), only names and date of licensure were recorded.

A majority of the licentiates, in the early years, came from New York State, and diplomas were presented from the Medical College of Vermont, the University of Pennsylvania, University of Vermont, Jefferson College, the Medical College of Burlington, Vermont, Fairfield Medical College, Castleton Medical College, Yale University, Medical College of the City of New York, College of Rhode Island, and the College of Physicians and Surgeons, Western District of New York. The only means of medical education was by the old method of apprenticeship, and the medical act provided for a term of three years study "with one or more reputable practitioners." The student must be twenty-one years of age or upward and of good moral character. The minutes of June 1, 1825 contain the announcement, "Dr. Ezra Parke gave notice that Lorenzo D. Webster has commenced reading Physic and Surgery with him."

Article 16 of the By-Laws, which were accepted by the Society on January 11, 1820, provided that "Any member who shall . . . pretend to know and practice with any nostrum may be reprimanded or expelled by two thirds of this society at any stated meeting." Article 17 stipulated that, "Each member shall be expected to communicate annually what have been the prevailing diseases in the circuit of his practice during the preceding year and what mode of treatment has been most successful." It was decided, on January 9, 1827, that members thereafter communicate their experiences in writing, to be entered on the record, and deposited in the archives. Dr. William Beaumont's compliance with this ruling is entered in the minutes of January 8, 1828.

Letter, dated August, 1827, from Dr. William Beaumont of the U. S. Army, an honorary member of this society, accompanied by a report of an interesting case of wounded stomach which occurred in his practice, together with some experiments on the digestive powers of the stomach, was read.

Dentistry did not become a distinct profession until 1840, when the first college of dentistry was organized in Baltimore.[6] It is not unusual, therefore, to find professional announcements similar to that of "Dr. S. Wilson, Physician, Surgeon, and Dentist," in the *Grand River Times* of July 15, 1837.[7]

[6] John A. Krout and Dixon R. Fox, *Completion of Independence, 1790-1830* (Macmillan, New York 1944) 310.

[7] A Dr. Stephen Wilson was licensed by the Territorial Medical Society on August 27, 1836.

As early as 1826, "S. Hardyear, Dentist," inserted the following notice in the *Michigan Herald* of Detroit.

Teeth.

The subscriber has taken a room for a short time at the Steamboat Hotel where he offers to perform all operations in Dentistry. Artificial teeth inserted, in most cases without pain, and warranted to retain their color.

| | |
|---|---|
| Inserting a tooth | $3,00 |
| Cleaning a set | 1,00 |
| Plugging a tooth (with tinfoil) | .50 |

Those who wish can be attended at their homes, without extra expense.[8]

Dr. James Taylor distributed a dainty, printed missive to prospective patients, announcing his arrival in Detroit, in May, 1830, "to devote a few days to the practice of Dental Surgery."[9] "Dr. Gaylord, Surgeon and Operative Dentist," paid a similar visit to Constantine, in 1837.[10] A. G. W. Smith, M.D., promised "to insert the various kinds of artificial teeth in such a manner as not to be detected."[11] Dr. J. L. Benson, Surgical Dentist, tendered his professional services, and also offered for sale, "Dr. Benson's Celebrated Vegetable Tooth Ache Drops," "Dr. Benson's Dentifrice," and an infallible pill for "the cure of dyspepsia, presented to him by one of the most eminent physicians in Europe, and perfectly free from mercury." In the news section of the *Democratic Free Press,* over the initials "J. L. B." he pleaded for early dental care, advising weekly or semi-weekly visits to the dentist.[12]

Nor was the traveling optometrist a stranger in the Territory. M. Keyser, lately arrived from Baltimore, on June 5, 1837 was ready to fit the citizens of Detroit with glasses, "which he will warrant to hold their power of vision from 5 to 8 years." He could also furnish large and small telescopes, spy glasses, concave and convex mirrors, magnifying glasses, and "microscopes, capable of magnifying objects 5000 times."[13]

The *Detroit Gazette,* on May 21, 1819, apprised local physicians of an important meeting, which resulted in the publication of the first edition of the United States *Pharmacopoeia,*

[8] *Michigan Herald,* Detroit, September 13, 1826.

[9] Chene Family, Papers, 1830-31. Dr. Taylor received his training in dental surgery at Dr. John Harris' School of Medical Instruction, Bainbridge, Ohio. He founded a dental college in Cincinnati, in 1845 (Madge E. Pickard and R. Carlyle Buley, *Midwest Pioneer; His Ills, Cures, and Doctors,* R. E. Banta, Crawfordville, Indiana 1945, 163-64).

[10] *Constantine Republican,* February 8, 1837.

[11] *Monroe Times,* December 22, 1836.

[12] *Democratic Free Press,* Detroit, May 26, June 9, June 16, 1831.

[13] *Detroit Free Press,* June 5, 1837.

National Pharmacopoeia.

The Middle District Convention of Delegates for the Middle States is to meet at the College of Physicians, Philadelphia, June 1st, for the purpose of forming a Pharmacopoeia.[14]

Frontier conditions were complicated by diseases indigenous to a newly settled country, as well as those to which the settlers had been accustomed in their former homes. Malaria, or "fever and ague," was so common that it was frequently called "The Michigan Disease." Contemporary accounts report that "people from the East were sick during the entire summer and early fall. Natives were usually in fair health, but not so well as in New York."[15] Even travelers succumbed. General Ellis, on his way to Wisconsin, told of his experiences:

I left New York in June, 1821 . . . . While at Detroit, I had contracted what was then known as "lake fever," a severe sickness, under which I languished for three weeks; but, now convalescing, was considered able to continue the trip. While on the boat between Detroit and Mackinac, I had a relapse, and, becoming worse than ever, I was carried ashore at the latter place in a hopeless condition. Dr. William Beaumont of the U. S. Army was called, and prescribed for me once, and left for Vermont, where he went to take a wife, turning me over to his assistant, a young man of generous impulses, and I was on my feet in a few days.[16]

On September 10, 1819, the *Detroit Gazette* reported that many were sick on account of unseasonably warm weather. "Bilious diseases" were most prevalent, and only one person had died during the past month of fever. In the earlier years, Peruvian bark, or cinchona, was advertised as a specific for the disease.[17] In 1835, Dr. W. Sumner of Constantine listed quinine among various medicines for sale.[18] Of course many nostrums were offered for the fever, but the one most advertised was "Rowand's Tonic Mixture," for which Chapin and Owen were general agents for the territory.[19]

The *Pontiac Courier* recorded the results of an injury from a falling tree to a young man near the village of Flint, in Genessee County. This type of accident must have occurred frequently while the forests were

[14] *Pharmacopoeia of the United States of America, 1820* (Boston 1820).

[15] David Ward, *Autobiography* (New York 1912) 37.

[16] General Albert G. Ellis, "Recollections," in Wisconsin Historical Society, *Collections* 7 (1873-76) 213.

[17] *Detroit Gazette,* August 22, 1817.

[18] *Michigan Statesman,* Bronson, October 16, 1835.

[19] *Michigan Sentinel,* Monroe, September 12, 1835; *Constantine Republican,* July 13, 1836; *Monroe Times,* July 28, 1836; *Constitutionalist,* Adrian, November 5, 1837. *Spirit of '76 and Theller's Daily Republican Advocate,* Detroit, February 15, 1840: John Owen announced the arrival of "120 dozens" of the tonic.

being cleared for homesteading. Dr. J. A. Hayes amputated one of the patient's legs and the young man was reported to be "fast recovering."[20]

There were frequent outbreaks of contagious diseases, the cholera epidemics of 1832 and 1834 being long remembered.[21] In 1837, physicians in Pontiac were divided into two camps regarding the diagnosis of an epidemic affecting a nearby town. Their differences were aired in the local press. On February 6, those supporting the diagnosis of smallpox addressed the editor of the *Pontiac Courier*:

> There were seventeen cases . . . all arising from the same specific contagion . . . differing only, as being in some, genuine "Smallpox," and in others, "Varioloid," which last is nothing more or less than a variety of the same disease excited in symptoms that have previously been subjected to the infection of "Kine Pox." All of the cases which have come under my observation, have been of that variety described as distinct Smallpox . . . . The same patients have recently and since their recovery from the prevailing epidemic, been vaccinated for kine pox by G. W. Williams and Co. [the opposite camp] and not in one single solitary instance has the infection taken.
>
> Israel B. Richardson
> Alex. Ayres
> Sterling W. Allen
> Isaac Paddock[22]

On June 21, 1837, Drs. Sumner and Baldy of Constantine notified the public that "vaccine matter" was available, and anyone wishing to be vaccinated could apply to them.[23] J. A. Riley of Detroit announced on February 15, 1840:

> Vaccine!! The subscriber has made arrangements for keeping constantly on hand and for sale, Vaccine Matter which he will warrant to be pure and in all cases taken from healthy children. Physicians and others from the country can be furnished with Matter that can be depended upon as first rate and fresh.[24]

Among the artisans and professional men migrating to the west, there were frequently to be found editors and printers whose services were welcomed in establishing newspapers to answer the commercial needs of the Territory. The *Detroit Gazette* was founded on July 25, 1817, as a weekly, consisting of four pages, measuring 9½ by 16½ inches.[25] Not much attention was given to local events, "news" items being garnered

[20] May 1, 1837.

[21] References to these cholera epidemics have been purposely omitted, because they constitute a story in themselves.

[22] Charles A. Neafie, "Oakland County Physicians One Hundred Years Ago," *Pontiac Daily Press*, September 18-29, 1931. All four men were licensed by the Territorial Medical Society. There is no mention in the society records of G. W. Williams.

[23] *Constantine Republican*, June 21, 1837.

[24] *Spirit of '76 and Theller's Daily Republican Advocate*, Detroit, February 15, 1840.

[25] George Catlin, *Story of Detroit* (Detroit News, Detroit 1926) 228.

mostly from foreign or eastern papers. Legal advertising and the publication of the Territorial Acts often occupied a page or so, but at least half the space of an issue was given over to commercial advertising. For some time, a portion of each edition was duplicated in French.

The first newspaper outside Detroit was the *Michigan Sentinel,* published at Monroe in 1825. By 1837, papers were appearing in a number of towns in the counties of the southern half of the lower peninsula.[26] They closely resembled the format of the *Detroit Gazette,* even though the *Constantine Republican* was reduced to pamphlet size for several numbers, because a shipment of paper had not arrived on schedule.[27] All were utilitarian in character and appealed primarily to the business man and his interests. They followed the evolution of papers in the older states, appearing first as weeklies, and, as subscribers increased, developing into semi-weeklies, and finally into dailies.[28]

Medical information and advice were frequently given to subscribers. One paper advocated the "use of blood root (*sanguinaria canadensis*)" as a cure for "polypus in the nose."[29] Another offered an "effectual remedy" for consumption, which would, in time, completely eradicate the disease. "Live temperately, avoid spirituous liquors, wear flannel next the skin, and take, every morning, half a pint of new milk, mixed with a wineglass full of the expressed juice of green hoarhound."[30] On July 19, 1837, the same paper quoted an item on "The Tomato" from the *Albany Cultivator*:

> We are receiving new evidence of the utility of this grateful garden vegetable in preserving health and curing indigestion, and diseases of the liver and lungs . . . . It mitigates and sometimes effectually checks a fit of coughing. It was used in a dried state with a little sugar mixed with it to render it more agreeable to the taste. The writer expresses a conviction that if freely used in July, August, and September, it would prove a complete antidote to bilious fever.[31]

The editor of the *Michigan Herald,* on July 26, 1825, expressed the common fear of hydrophobia, a constant menace of the period.

> In Detroit, where is to be found the most numerous and formidable array of dogs in the world, we are daily and hourly in danger of this most terrible of all diseases; and it becomes our citizens to be on their guard, and our physicians to

[26] Douglas C. Murtrie, *Early Printing in Michigan, with a Bibliography of the Issues of the Michigan Press, 1796–1850* (John Calhoun Club, Chicago 1931) 227-320.

[27] *Constantine Republican,* December 6, 13, 1837.

[28] Alfred M. Lee, *Daily Newspapers in America. The Evolution of a Social Instrument* (Macmillan, New York 1937) 58.

[29] *Michigan Herald,* Detroit, May 17, 1826.

[30] *Constantine Republican,* September 13, 1837.

[31] See also the account of the tomato in Pickard and Buley, *op. cit.* (see note 9 above) 282-83.

be prepared for the exigency. It is quite bad enough that our premises are invaded and plundered and our sleep disturbed by this more than Egyptian swarm of dogs; let the hydrophobia get among them, and the danger of our situation can better be imagined than described. We believe that the City Council have passed an ordinance with a view to remedy the evil, at least so far as to prevent the canine race from getting, altogether, the upper hand; but the measure appears not to have been acted upon.[32]

A unique item appeared in the *Oakland Chronicle* for October 8, 1830. Unique, because vital staitstics did not appear frequently in the newspapers of the time. No source was given for the "Report of Deaths in the County of Oakland, from January 1st to October 8, 1830." Population—6000, Fever—2, Childbed—2, Affection of the liver—1, By accident—2, Consumption—2.[33]

"Dry Goods, Groceries, Hardware, Stationery, Drugs and Medicines, Iron, Steel, Shot, Powder, and Lead."[34] Such captions were familiar enough in the older thirteen states, toward the end of the eighteenth century, and appeared frequently in the Michigan press between 1817 and 1837. Under the heading of "Drugs and Medicines" are enumerated a number of old nostrums used both in Great Britain and the United States for several centuries.[35] It is not inconceivable that some of them appeared in that first advertising supplement announced reluctantly in June 1666 by the *London Gazette,* "being daily prest to the publication of Books, Medicines, and other things not properly the business of a Paper of Intelligence."[36]

Before the American Revolution, British traders found the importation of patent medicines into the Colonies a profitable business. Here, they were sold in general stores, apothecary shops, or by pedlars in the hinterland.[37] About 1730, Benjamin Franklin opened a store in Philadelphia, where he sold coffee, tea, and patent medicines, and advertised his wares in his own paper, the *Pennsylvania Gazette.*[38]

[32] *Michigan Herald,* Detroit, July 26, 1825.

[33] *Oakland Chonicle,* Pontiac, October 8, 1830. At a later date, 1850–65, mortality rates in Detroit were tabulated from reports of sextons of the city's cemeteries.

[34] John R. Williams' Yellow Store, *Detroit Gazette,* September 5, 1817; Peter J. Desnoyers, *ibid.,* November 7, 1817; Variety Store, *Michigan Emigrant,* Ann Arbor, December 26, 1833; *Constantine Republican,* February 1, 1837; Bulkley and Noble, *Michigan Sentinel,* Monroe, September 12, 1835.

[35] *Detroit Gazette,* July 25, August 22, 1817; *Monroe Times,* July 28, 1836; and many others.

[36] Quoted in Sidney Walton, Thomas Russell, and Frank Grahan, "Advertising," in *Encyclopedia Britannica* (London 1929) 17. 368.

[37] Cedric Larson, "Patent Medicine Advertising and the Early American Press," *Journalism Quarterly* 14 (1937) 334.

[38] Edward Kremers and George Urdang, *History of Pharmacy* (J. B. Lippincott, Philadelphia 1940) 140-41.

Possibly the most famous of the proprietary or private medicines was "Anderson's Scotch Pills," which had survived from the seventeenth century. They were first compounded in 1635 by Dr. Patrick Anderson, a reputable physician practicing in London during the Stuart Period. After his death the formula, consisting of aloes, jalap, gamboge, and anise, was sold in Edinburgh by his daughter, who deeded it to Thomas Weir, surgeon, on December 16, 1686. To Dr. Weir, letters patent were granted by King James II, in 1687, with Letters of Certification by King William and Queen Mary in 1694, and Testification by the Town Council of Edinburgh in the same year. The secret was conveyed from heir to direct heir until 1876, when it was sold with the house where it was manufactured to Messrs. Raimes, Blanshard & Co. In 1910, there was still some demand for "The Scot's Pills."[39] They were in common use in the New England Colonies, and were advertised in the *Pennsylvania Evening Post and Daily Advertiser* in 1784.[40]

"Godfrey's Cordial" was a similar hereditary nostrum. An advertisement appearing in *Reed's Weekly Journal,* February 22, 1722, announced:

> The general cordial formerly sold by Mr. Thomas Godfrey in Hertfordshire, deceased, is now prepared according to a receipt written by his own hand and by him given to my wife, his relation, is now sold by me, Thomas Humphreys, at the Head and Sheers in Jewin St., near Cripplegate, London.

In 1833, in order to ensure uniformity, the Philadelphia College of Pharmacy adopted the formula "Tinc. opii, molasses, alcohol, water, carbonate of potash, and oil of sassafras."[41]

"Gregory's Pills" was a favorite prescription of Dr. James Gregory of Edinburgh, who died in 1822. The formula, consisting of magnesia and rhubarb, may be found in the British *Pharmacopoeia.*[42]

"Opodeldoc" (opoponax, bedellum, and aristolochia root) was an even older medicament than those mentioned, being first used by Paracelsus (1493–1541) for healing wounds and ulcers. It was included in the Edinburgh *Pharmacopoeia* in 1722. Whether or not it was ever patented is unknown.[43]

[39] A. C. Wooton, *Chronicles of Pharmacy* (Macmillan, London 1910) 2. 168-70.

[40] Kremers and Urdang, *op. cit.* 140; Lee, *op. cit.* (see note 28, above) 58; Larson, *op. cit.* 337.

[41] Wootton, *op. cit.* 2. 178; Larson, *ibid.*; *Detroit Gazette,* July 25, 1817.

[42] Wootton, *op. cit.* 2. 137-38; *Monroe Times,* July 28, 1836; *Detroit Free Press,* June 5, 1837; *Michigan Sentinel,* Monroe, September 12, 1835.

[43] Wootton, *op. cit.* 2. 148-50; Larson, *ibid.*; *Detroit Gazette,* July 25, 1817; *Constantine Republican,* October 12, 1836; *Detroit Free Press,* June 5, 1837; *Grand River Times,* July 15, 1837; *Emigrant,* Ann Arbor, December 16, 1829, October 3, 1832; *Michigan Sentinel,* Monroe, September 2, 1835.

"Dr. Solomon" obviously emphasized the biblical association of his remedy, but, while "Balm of Gilead" is "an oily gum, used in the treatment of sores and wounds in the East," it was not the "balm of gilead" to which the Bible refers.[44]

"Stoughton's Bitters, or Great Cordial Elixir" was patented in 1712.[45] "Turlington's Balsam of Life" (Tinc. Benzoin Co.) was an adaptation or copy of various compounds sold on the British market for years. Under the name of "Traumatic Balsam," it appeared in the *London Pharmacopoeia* of 1746 as a remedy for wounds.[46] In 1741, it was advertised in New England as having been "prepared by Mr. Turlington, the patentee, and sent to John Vintenon . . . in Boston."[47] In 1784, it is listed in the *Pennsylvania Evening Post and Daily Advertiser* under the heading of "Genuine Patent Medicines."[48]

"Glauber's Salts" is an example of one of those medicines purchased by European monarchs as a public service. Sulphate of soda was discovered in 1651, by John Rudolph Glauber, who kept its process secret. After the inventor's death, it finally came into the possession of the surgeon, La Ligerie, who sold it to Louis XIV for a large sum of money. Under the name of *"poudre des Chartres,"* it was one of the most popular remedies in France for smallpox, ague, dropsy, syphilis, and other diseases.[49]

The Revolutionary War and the War of 1812 not only interrupted trade with Europe for some time, but forced an ingenious people into many new ventures. The possibilities of the patent medicine business were soon discovered. One of the most successful "new" remedies was "Swaim's Panacea," the origin of which was investigated in 1827 by the Medical Society of the City of New York. In 1811, Dr. Berger of New York City called several colleagues into consultation in a case of syphilis. A medicament known as "the rob of Laffecteur," a kind of jelly or paste, was decided upon and administered with good effect. Because the War of 1812 prevented the importation of some of the ingredients of the "rob," a recipe of "M. Allion, a French chymist," was substituted, using bark of sassafras or shavings of guaiacum for marsh reed-grass. The pre-

[44] Wootton, *op. cit.* 1. 49; Thomas H. Jones, "Patent Medicines," *Good Words* 2 (1861) 265; *Detroit Gazette,* July 17, 1817.

[45] Wootton, *op. cit.* 2. 162; Larson, *op. cit.* 337; *Detroit Gazette,* July 17, 1817.

[46] Wootton, *op. cit.* 2. 140; *Emigrant,* Ann Arbor, December 16, 1829; *Detroit Gazette,* July 17, 1817.

[47] Kremers and Urdang, *op. cit.* 140.

[48] Lee, *op. cit.* 58; *Detroit Gazette,* July 25, August 22, 1817.

[49] Wootton, *op. cit.* 1. 381-82; *Detroit Gazette,* July 25, August 22, 1817.

scription was published in the *Medical and Philosophical Journal and Review,* because of its efficacy, and was widely used by physicians in the vicinity. William Swaim, a bookbinder, was then a patient under the care of Dr. N. J. Quackenboss, who prescribed the medicine, with excellent results. Swaim obtained the prescription from the physician, and went to Philadelphia, where he manufactured it, selling it under the trade name of "Swaim's Panacea," for five dollars a bottle. The investigators discovered that corrosive sublimate had been added to the original preparation, causing the profuse salivation often following its use.[50]

Swaim's tactics rivalled those of any modern promoter. The nostrum was widely advertised.[51] Dr. William Price, an official of the Philadelphia Alms House, was induced to try out the panacea on patients of that institution, and was sent to England to introduce it there. Unwary physicians were either hoodwinked into giving testimonials as to its beneficial results, or their signatures were used without their knowledge.[52]

As late as 1912, the American Medical Association explained the difficulty of distinguishing between "patent medicines" and "ethical proprietaries." It was not unusual for a nostrum first to be exploited only to the medical profession as an "ethical proprietary." After a sufficient number of testimonials had been received from unthinking physicians, promoters of nostrums advertised their wares to the public as "patent medicines."[53] To guard against any contingency of the kind, the Michigan State Medical Society, in 1913, ruled that the advertising pages of its *Journal* must thereafter comply with the Reports of the Council on Pharmacy and Chemistry of the American Medical Association.[54]

In their report on "Secret Remedies," the New York Medical Society included "Swaim's Panacea," "Potter's Catholicon," and "Shinn's Panacea," declaring them to be essentially the same.[55] Whether or not there was any connection between Shinn and Swaim is not clear. Perhaps Swaim's popularity was waning, or he saw an opportunity to lower his

[50] "Secret Remedies. Report of the Medical Society of the City of New York on Nostrums or Secret Remedies," *Amer. Jour. Med. Sci.* 1(1827–28) 248-49; "Report of the Philadelphia Medical Society on Swaim's Panacea," *ibid.* 1(1827–28) 483.

[51] Pickard and Buley, *op. cit.* (see note 9, above) 273, 274; Dr. Justin Rice's General Store, *Michigan Herald,* Detroit, December 5, 1827; *Michigan Sentinel,* Monroe, October 28, 1825, September 12, 1835; *Monroe Times,* July 28, 1836.

[52] *Journal of Health* 2(1831) 302, 337, 338; "Report of the Philadelphia Medical Society," *Amer. Jour. Med. Sci.* 1 (1827–28) 483-86.

[53] American Medical Association, *Nostrums and Quackery* (Chicago 1912) 7.

[54] "Editorial," *Michigan State Medical Society Journal* 12(1913) 118.

[55] *Amer. Jour. Med. Sci.* 1(1827–28) 248.

prices without jeopardizing his original product. The following advertisement is an example of the masterly methods Swaim, or Shinn, used in the West,[56]

Shinn's Panacea

The subscriber, having discovered the composition of Swaim's celebrated panacea, has now a supply on hand for sale. He has reduced the price from $3.50 to $2.50, or by the dozen — $24.

All charitable institutions in the United States and the poor will be supplied gratis.

If the citizens of the principal towns will appoint an agent to order and distribute this medicine to the poor, it will be supplied.

This medicine is celebrated for the cure of the following diseases: scrofula, or King's Evil, ulcerated or putrid sore throat, long standing rheumatic affections, cutaneous diseases of the bones, and all cases generally of an ulcerous character, and chronic diseases, generally arising in debilitated constitutions, but more especially from syphilis, or affections arising therefrom, ulcers arising in the larynx, etc., and that dreadful disease occasioned by a long and excessive use of mercury, etc. It is also useful in diseases of the liver.

The manufacturer of a nostrum known as "The Druid's Pills," composed of flour, lard, and weak tobacco tea, related that "he lived magnificently from the profits of his invention," and sold his copyright for a sum "that would open the eyes of any plodding every day trader."[57] We can only surmise that Shinn, or Swaim, derived comparable returns from his enterprise.

During the eighteenth century, many of the old medicines were to be found in the apothecary shops kept by physicians, as an additional source of income to their regular practice. Tea, coffee, and spices, regarded at that time as luxuries, were often added to the stock in trade. William Douglas, a Boston physician, declared there were fourteen of these shops in his native city, many of which were advertised in local newspapers.[58] Dr. Zabdiel Boylston advertised capers and snuff as well as medicines in the *Boston Gazette,* in 1723, 1724, and 1725.[59] In 1776, in the *New York Gazette and Weekly Mercury,* Dr. Atwood announced his stock of "wines, spices, Turlington's balsam, Bateman's drops, Haerlem oil, British oil, Anderson's pills, Hooper's pills, Lockyer's pills, James's fever powders, Hill's balsam of honey, a paste for preserving teeth and gums, Greenough's tincture for the teeth, Boerhagg's balsam."[60] Daniel Drake

[56] *Michigan Sentinel,* Monroe, October 28, 1825.

[57] Jones, *op. cit.* (see note 44, above) 371-75.

[58] Kremers and Urdang, *op. cit.* (see note 38, above) 138-39, 163.

[59] *Ibid.* 139; Larson, *op. cit.* (see note 37, above) 334.

[60] Maurice B. Gordon, "Medicine in Colonial New Jersey and Adjacent Areas," *Bull. Hist. Med.* 17(1945) 51.

was familiar with similar shops in his youth, and, later in his career, opened one himself, where he, too, sold patent medicines and drugs.[61]

It is not surprising, therefore, to find an announcement in the first issue of the *Detroit Gazette* by Dr. John L. Whiting, to the effect that "he has a small but good assortment of DRUGS AND MEDICINES, which he offers at a very moderate advance." A postscript adds, "he will punctually attend to any calls with which he may be honored either in the practice of Medicine or Surgery."[62] A later insertion by Dr. Whiting, on October 24, 1817, gives some idea of the medicines in use by the orthodox physician of the day: "Aloes, arnatto, antimony, crude arsenic, alkohol, juniper berries, bals. copaiva, borax, camphor, calomel, cassia, fol. digitalis, ivory black, liquorice ball, verdigris, pearl ashes, and brimstone."[63]

On October 16, 1835, Dr. Watson Sumner of Constantine offered "a fresh assortment of genuine articles of medicine. Physicians and others may be supplied on liberal terms."[64] A year later, Dr. Sumner and Dr. Peter Baldy "concluded a partnership in the business of their profession," and announced their intention of "keeping constantly for sale a general assortment of selected and genuine articles of medicine with which they will supply physicians and others."[65] Dr. David L. Porter, of Pontiac, imported drugs and medicines from New York for sale in his "Druggist Store."[66]

The fact that so many physicians entered into other activities would indicate that the profession of medicine was not lucrative enough in itself to support them entirely. The pronouncement of the *Michigan Herald,* on September 20, 1825, shows the economic needs of the region at the time, as well as the temper of the people:

The demand for mechanic labor, and labor of every description connected with building is greater than can be supplied, which has the effect of enhancing wages,

[61] Pickard and Buley, *op. cit.* 128, 273.

[62] *Detroit Gazette,* July 25, 1817. John L. Whiting (1793–1880), who came from Hudson, New York in 1816, was prominent in Territorial affairs, charter member of the Territorial Medical Society, and later entered business.

[63] *Detroit Gazette,* October 24, 1817. Aloes, antimony, quassia, arsenic, calomel, and digitalis included in the *Pharmacopoeia* of London, compiled by the College of Physicians of London at intervals from 1618 to 1851 (10th ed.) The first U. S. *Pharmacopoeia* was published in 1820.

[64] *Constantine Republican,* October 16, 1835.

[65] *Ibid.,* July 13, 1836. Both Drs. Sumner and Baldy were licensed by the Territorial Medical Society on July 16, 1836.

[66] *Oakland Chronicle,* Pontiac, June 1, 1830. David L. Porter (1808– ) was born in Waterford, N. Y., graduated from Medical College, Burlington, Vt., licensed by Territorial Medical Society, October 23, 1829, became member of Medical Society, January 12, 1830.

and retarding the improvement of the city. Carpenters, Masons, Brick-makers, and common laborers from abroad, will undoubtedly for some years to come, find employment and good wages, not only in Detroit, but in the interior of the territory. Every industrious mechanic, who comes here from abroad, is a valuable acquisition and is of more immediate utility than a shipload of lawyers and doctors.

Abraham Edwards, Randall S. Rice, John Truax, Marshall Chapin, Philip Brigham, and Alonzo Platt were proprietors of general stores, which carried "Drugs and Medicines" as an important department in their establishments.[67] Dr. Edward A. Theller, "wholesale grocer and provision merchant," established his grocery business on Atwater Street. A hint of the present day drug store appeared in his advertisement of January 25, 1837:

. . .Also at 119 Jefferson Ave., wholesale and retail. A large and well-selected assortment of genuine drugs, medicines, chemicals, patent medicines, perfumery, etc., which he offers on as favorable terms as can be had in the city. Orders from the country supplied on the shortest notice.[68]

Six months later, he announced his association with Dr. Lewis F. Starkey, "a practical surgeon," "one of the firm to be found at all times at the Drugstore of Dr. Theller." Surgical instruments were also sold.[69]

Not only did physicians stock patent medicines in their shops and general stores but they also acted as local agents for them. A typical example was "Dr Bloodgood's Elixir of Health," for which the agent was Dr. Harry Conant of Monroe.[70] In addition to numerous miraculous powers claimed for the nostrum, its manufacturer, H. Eastman of Zanesville,

[67] Abraham Edwards, *Detroit Gazette,* July 23, 1819.

Randall S. Rice (1793–1860), charter member of Territorial Medical Society; *Detroit Gazette,* March 27, 1818.

John Truax, introductory letter from Schenectady, N. Y. to John R. Williams, July 28, 1826, stated he intended to practice medicine and open a drug store (John R. Williams, *Papers, 1782–1850*), member of Territorial Medical Society June 12, 1827; *Democratic Free Press,* Detroit, May 26, June 16, June 30, July 7, 1831.

Marshall Chapin (1798–1838), admitted to membership in Territorial Medical Society, June 12, 1821; *Detroit Evening Spectator and Literary Gazette,* January 25, 1837.

Philip Brigham, said to have worked with Dr. Valentine Mott of New York City in 1813; not identifiable in records of Territorial Medical Society; *Michigan Emigrant,* Ann Arbor, December 26, 1833.

Alonzo Platt, *Michigan Emigrant,* Ann Arbor, December 26, 1833; Secretary of Washtenaw Medical Society, *Michigan Whig,* Ann Arbor, January 15, 1835.

[68] E. A. Theller (1804–59), Irish physician, author of *Canada, 1837–38* (Philadelphia 1841), depicting experiences in Patriot War; also published *Spirit of '76 and Theller's Daily Republican,* 1839–40. One issue, February 15, 1840, on file in the Burton Historical Collection, contains a number of patent medicine advertisements; licensed by Territorial Medical Society, September 28, 1835.

L. F. Starkey ( –1848), licensed May 10, 1836, called "eye-specialist," in Friend Palmer, *Early Days in Detroit* (Hunt and June, Detroit 1906) 893.

*Detroit Evening Spectator and Literary Gazette,* January 25, 1837; *Detroit Free Press,* June 6, 1837.

[69] *Detroit Free Press,* June 5, 1837.

[70] *Michigan Sentinel,* Monroe, September 12, 1835. Dr. Harry Conant was elected a member of Territorial Medical Society, June 13, 1820.

Ohio, asserted, "It is a sovereign remedy in all those complaints for which Dr. Hooper's Female Pills are recommended — removing all obstructions and restoring bloom to the sickly and sallow cheek and plumpness to the meagre."[71] A "Chemical Plaster," prepared by E. Dean, Drug and Medical Store, Westfield, Chautauqua County, New York, was sold by Dr. Conant, Chapin and Owen of Detroit, and Brigham and Platt of Ann Arbor.[72] In addition to expounding the marvelous qualities of his panacea, E. Dean offered some helpful medical advice,

> In case of severe inflammation, bleeding and a dose or two of gentle Physic may be necessary, and the plaster wants changing or a thin coat added every 24 hours. In case of fever sore, daily use of syrup made of the Burdock Root for some weeks would be helpful and important. . . . It will be found highly useful for drafts on the feet, also for strains and bruises on horses.[73]

Drs. Sumner and Baldy sold "Dr. Phinney's Anti-Dyspeptic or Bilious Pills," which seemingly covered the gamut of human ills.[74]

Merchandise, including medicines, was "sold at reduced prices for cash," or, "all kinds of produce taken in payment, cash for wheat, hides, skins, furs, and peltries of all descriptions."[75] Newpaper publishers accepted "most kinds of produce in payment at cash prices," and were forced to use their own columns to plead for payments due.[76]

Physicians frequently resorted to the newspaper in an effort to secure their own long overdue accounts. Dr. Cyril Nichols of Dexter pleaded that, "the precarious state of the subscriber's health obliges him to call on all persons indebted to him to arrange immediately the payment of all Notes and accounts up to the first day of July last."[77] A note of sarcasm crept into a plea for payment, on July 28, 1836, by Dr. J. V. D. Sutphin of Tremainville,

> Cash to loan.
>
> I want some of the above article to loan my friends, pay debts, etc., etc., and would politely intimate to those indebted to me, that all accounts not settled by

[71] Patent for "John Hooper's Female Pills" granted in 1743 to John Hooper, apothecary and man midwife of Reading, England (Wootton, *op. cit.* 2. 163-64). Advertised as a "Genuine Patent Medicine" in *Pennsylvania Evening Post,* 1784 (Lee, *op. cit.* 58; Larson, *op. cit.* 337).

[72] *Michigan Sentinel,* Monroe June 14, 1834; *Michigan Whig,* Ann Arbor, January 15, 1835; *Constitutionalist,* Adrian, November 15, 1837.

[73] *Michigan Whig,* Ann Arbor, January 15, 1835.

[74] *Constantine Republican,* June 14, 1837.

[75] *Detroit Gazette,* November 7, 1817; *Emigrant,* Ann Arbor, October 3, 1832.

[76] *Michigan Sentinel,* Monroe, October 28, 1825, June 18, 1831.

[77] *Emigrant,* Ann Arbor, December 28, 1831. Dr. Nichols was licensed by the Michigan Territorial Medical Society, after examination, June 13, 1820, and admitted to membership.

the 1st of August will be found in the hands of Horace Thatcher, Esq., who will inform them of the fact.[78]

Although a bank had been chartered in the Territory in 1817, with authority to issue notes, redeemable on demand, currency was not plentiful. "Notes," or bills of exchange, were in wide use. On December 23, 1830, Dr. Randall S. Rice of Detroit gave his note to Mr. G. Chesne,

> Please to let the bearer have 200# of Hay and I will account to you for same.
> December 23, 1830 R. S. Rice[79]

Warnings about such transactions are frequently found in newspapers of the period.

> The public are hereby cautioned against purchasing a note of between eighty and ninety dollars bearing date either August or September -th, 1836, given by Elijah Smith to Dr. —— Cowee; I not having received the value of said note.
> Elijah Smith
> Flint, February 14, 1837[80]

The press of the Territory reflects the activities of physicians, professional and otherwise, sometimes in contrast to present-day ethics. The general public were acquainted with their abilities by means of "professional cards," inserted in the local papers. Dr. Douglass Houghton's simple "Physician and Surgeon" was a common example.[81] A succinct announcement appeared in the *Michigan Whig* of Ann Arbor, on February 26, 1835:

> Dr. Gurley
> Late of Ontario County, New York. If you have need, try him—if you like him, retain him—if not, dismiss him.

Dr. John B. Chamberlain reminded readers of the *Herald* in Amherstburg and Sandwich, Ontario, of his Canadian training and his licensure before the Royal Board of Physicians in 1809.[82] He contributed a series of three

[78] *Monroe Times,* July 28, 1836. Dr. Sutphin was a member of the Territorial Medical Society, licensed June 13, 1826, credentials from Medical College of Vermont and College of Physicians and Surgeons, Western District, New York. He was one of the few medical men in the Territory who made contributions to medical literature. "Inquiries and Observations on the Bilious Remitting Fevers of Michigan," *N. Y. Med. Jour.* 1 (November-February 1830–31) 81–95, 276-302; 2 (May-August 1831) 35-54.

[79] Arthur M. Schlesinger, Jr., *Age of Jackson* (Little, Brown, Boston 1945) 527; Chene Family, Papers, 1830–31, Manuscript, Burton Historical Collection.

[80] *Pontiac Courier,* March 13, 1837. A William Cowee was licensed by the territorial Medical Society on September 9, 1833, from New York.

[81] *Democratic Free Press,* Detroit, January 2, 1833. Douglass Houghton (1809–45), licensed November 6, 1832 by Territorial Medical Society, first state geologist, met his death while on a scientific mission in Lake Superior.

[82] *Michigan Herald,* Detroit, January 10, 1827. Dr. Chamberlain applied for admission to the Territorial Medical Society on June 13, 1820. Minutes of the Society state, "To be postponed to next meeting." There is no further entry regarding Dr. Chamberlain.

articles, entitled "Remarks on Calomel" to the same paper.[83] Drs. John Hendree and Thomas B. Clarke had offices in general stores maintaining drug departments.[84] Dr. William McCoskry announced his removal to "the House of Major Whipple, lately occupied by Dr. Day."[85]

Dr. Abraham Edwards, who first came to Detroit in charge of the Medical Department of General Hull's Army in 1812, was engaged in numerous financial enterprises. The *Detroit Gazette* of July 23, 1819, carried his advertisement for his coopering business; on February 25, 1820, he is listed as an auctioneer. His general store was featured in the commercial section of the issue of June 16,1820. On September 8, his "Boot and Shoe Manufactory" notice carried a postscript, "The coopering business is still carried on at the old stand." Dr. Samuel Denton of Ann Arbor was interested in the promotion of "Oleum Zeae," or Corn Oil, produced by "a recent improvement in the art of distilling the meal of Maize, or Indian Corn; by which a quantity of beautiful and valuable oil is procured, the whiskey greatly increased in quantity and improved in its quality." Dr. A. L. Hays gave a testimonial in the *Emigrant,* stating that it was an important acquisition to the Materia Medica as a cathartic and substitute for olive oil.[86]

Dr. Denton "informed the people of Washtenaw and the neighboring counties, that he has procured a complete assortment of surgical instruments and preparations among which are amputating, trephining, obstetrick, and cupping instruments, and improved splints of different kinds for fractures, Electric Machines, ETC., and is ready to attend to all calls in the surgical department of his profession."[87] On October 3, 1832, he formed a partnership with Philip Brigham in the same specialty.[88] Dr. Ezekiel Webb supplemented his profession with an appointment as postmaster of Farmington, and sponsored "Pyroligneous acid, or Essence of Smoke for preserving beef, pork, hams and fish, Sold at the Druggist

[83] *Michigan Herald,* Detroit, January 24, February 14, March 14, 1827.

[84] *Ibid.,* July 12, May 3, 1826. John Hendree, Licensed June 30, 1826, diploma from University of Pennsylvania. Thomas B. Clarke, licensed June 13, 1826, certificate from Medical Society of New York City. Both members of the Territorial Medical Society.

[85] William McCoskry (1763–1831) first came to Detroit as a surgeon with General Anthony Wayne's Army. According to records of the Territorial Medical Society, he was not licensed and never a member of the Society. His ledgers are in the Manuscript Collection of the Burton Historical Collection.

For Sylvester Day ( –1851), see Harvey E. Brown, *Medical Department of the United States Army from 1775 to 1873* (Washington 1873) 273.

[86] *Emigrant,* Ann Arbor, December 30, 1829. Andrew Hays (1803–64) was licensed May 21, 1829.

[87] *Ibid.,* April 13, 1831.

[88] *Ibid.,* October 3, 1832.

store of M. Chapin & Co." The product was probably his own invention.[89]

As communities grew and governmental machinery was set up, the need of medical services in some departments became necessary. Dr. John L. Whiting received the sum of $63.13 "for attendance and medicines for prisoners of Wayne County from July 4, 1818 to July 12, 1820."[90] The method of choosing a physician for the county service is disclosed with the announcement:

> Sealed proposals will be received by the subscriber until the 23rd inst. for all medicines, medical and surgical services necessary for the prisoners who are, or may be, confined in the jail of the County of Wayne and for the county paupers belonging to the townships of Detroit, Hamtramck, and Springwells. The whole to be included in one contract to be made for the term of one year commencing on 23 November, 1831. By order of the board of Supervisors of the County of Wayne.
>
> J. M. Wilson, Sheriff[91]

Several of the Territory's leading citizens served in the United States Medical Department. Dr. Zina Pitcher (1797–1872), who distinguished himself in the field of education, as well as in medicine, was stationed, at various times, at army posts along the border — Saginaw, Detroit, Fort Brady, and Fort Gratiot. He resigned from the service in 1836, to go into private practice in Detroit.

William Beaumont, of course, is the classical example of the post surgeon assigned to the frontier posts of Michigan. On June 23, 1820, the *Detroit Gazette* reported:

> Last Wednesday morning, the Steam Boat Walk-in-the-Water left this place for Mackinac. She has a cargo of goods for the American Fur Co. . . . and Dr. Beaumont among the passengers.[92]

For a period of fifty years after the reorganization of the United States Army Medical Corps, in 1818, the weather observations of medical officers stationed at military posts constituted the only statistics of the kind.[93] It is significant, therefore, to find an item in the *Michigan Herald* of Detroit, January 24, 1827, recording subzero temperatures for the week of January 15:

[89] *Michigan Herald,* Detroit, November 29, 1825, February 21, 1826.

[90] "Abstract of Accounts Audited and Allowed by the Commissioners of the County of Wayne, from July 4, 1818 to July 12, 1820," *Detroit Gazette,* September 1, 1820.

[91] *Democratic Free Press,* Detroit, November 10, 1831.

[92] *Detroit Gazette,* June 23, 1820.

[93] Merritte W. Ireland, "Medical Corps of the Army and Scientific Medicine," in Mayo Foundation and Universities of Minnesota, Wisconsin, Iowa, and the Des Moines Academy of Medicine, *Lectures on the History of Medicine, 1926–32* (W. B. Saunders, Philadelphia 1933) 441.

The Weather. We are indebted to Dr. Henry for the following observations on the state of the thermometer during the last week, shewing degrees of cold unusual to this climate.

In 1822, 1503 residents were liable for militia duty in Michigan. They were divided into two brigades, organized by counties. Col. John R. Williams was in command of the first brigade, of which Dr. John L. Whiting had been commissioned as surgeon in 1818.[94] Only a medical certificate could excuse a citizen from service. Dr. Whiting, on November 8, 1831, certified that Mr. Gabriel Chene had a rupture of the left side, which exonerated him from the performance of military duty.[95]

Since Detroit was the capital of the Territory, the territorial machinery of government was centered there, and physicians of the city had a greater opportunity to serve the community in a civil capacity than those in the interior. As early as 1817 Judge Augustus Woodward had devised an ambitious plan for an educational system, which was established by Act of the Legislative Council. Two units were the "University of Michigania" and the "Classical Academy." Dr. Abraham Edwards was appointed treasurer of the former institution and Dr. John L. Whiting register. Dr. Whiting received $18.75 per year for his services. Among the trustees and "visitors" of the Classical Academy were the names of William Brown, Sylvester Day, Abraham Edwards, and John L. Whiting.[96]

In 1820, Lemuel Shattuck, a native of Massachusetts, was in charge of the Classical Academy. On October 20, he announced in the pages of the *Detroit Gazette,*

An Evening School

Is opened at the Academy, from 6 till 9 o'clock, on the evenings of Monday, Wednesday, and Friday; where the common branches of an English education and the elements of mathematics are taught. Terms will be made known by applying to the subscriber at the Academy.

Shattuck distinguished himself in later years by drafting a document of historical importance in the field of public health, *The Report of a General Plan for the Promotion of Public and Personal Health, Devised, Prepared, and Recommended by the Commissioners Appointed under a Resolve of the Legislature of Massachusetts, Relating to a Sanitary Survey*

[94] John L. Whiting (1793–1880), in Clarence M. Burton, Physicians of Old Detroit, Typescript, Burton Historical Collection. *Michigan Herald,* Detroit, March 14, 1826, "Abstract of Returns of the Militia of the United States with Date of Returns as Transmitted by the Secretary of War." *Michigan Herald,* Detroit, May 17, 1826.

[95] Chene Family, Papers, 1830–31, Manuscript, Burton Historical Collection.

[96] *Detroit Gazette,* September 19, 1817.

*of the State. Presented April 25, 1850.*[97] This memorable paper led to the creation of the Massachusetts State Board of Health nineteen years later.

Abraham Edwards served as president of the Legislative Council of the Territory, and Randall Rice acted as clerk.[98] From July 4, 1818 to July 12, 1820, William Brown and Edwards were commissioners for Wayne County, each receiving $45 for his services, for the period specified.[99]

Citizens of the Territory took their politics very seriously. When the population had increased enough to permit Michigan to send a delegate to Congress, the election campaign showed none of the apathy usually displayed today at election time. At one meeting of citizens, held in Detroit, to promote the election of William Woodbridge, Dr. William Brown presided as chairman, and Drs. S. C. Henry, John L. Whiting, and James Witherell took an active part. Edwards was chairman of a similar meeting opposing Woodbridge.[100]

The territorial period of Michigan coincided with an era in the nation's history, when the United States was expanding not only physically, but industrially as well, necessitating many adjustments and extending political ideas regarding the dignity and freedom of the individual into the social and economic spheres of life.[101] As the nineteenth century progressed, the need for certain changes in all these spheres became more evident, even in the less populated and newly settled regions of the country.[102] The consensus of public opinion was in favor of discussion and education, to solve problems of an intellectual plane. To this end, a multitude of societies were organized in Michigan.

The "Lyceum of Detroit" was formed for "improvement in public speaking," with the redoubtable Judge Augustus Woodward, as president and Dr. John L. Whiting as treasurer.[103] The society, in 1820, requested a report of the account current, January 1, 1818 to February 1, 1820, from the treasurer of the Territory.[104] Was this a forerunner of the

[97] (Boston 1850). Lemuel Shattuck (1793–1859), born Ashby, Massachusetts, taught school in the East before coming to Michigan. He organized the first Sunday School in Michigan and introduced modern methods into taking of the census in Massachusetts and the United States.

[98] *Michigan Herald*, Detroit, November 8, 1826.

[99] *Detroit Gazette*, September 1, 1820, "Abstract of Accounts Audited and Allowed by the Commissioners of the County of Wayne, July 4, 1818 to July 12, 1820."

[100] *Detroit Gazette*, August 20, August 27, September 3, 1819. James Witherell (1759–1838), practiced medicine in Fairborn, Vt., appointed Judge of the Michigan Territory in 1808.

[101] Schlesinger, *op. cit.* (see note 79, above).

[102] Richard H. Shryock, "Public Relations of the Medical Profession in Great Britain and the United States," *Ann. Med. Hist. N. S.* 2(1930) 317.

[103] *Detroit Gazette*, January 16, 1818.

[104] *Ibid.*, September 8, 1820.

"muck-racking" era of a later day? The "Mechanics' Society" was in existence in 1820.[105] The "Young Men's Society" was enjoying a course of lectures on "Galvanism and Electromagnetism," delivered by A. R. Terry, M.D.[106] A book, carrying the inscription of the society, written by a distinguished physician of the time, is a surviving example of their scientific interest. *An Inquiry into the Claims of Dr. William Harvey to the Discovery of the Circulation of the Blood; with a More Equitable Retrospect of that Event,* by John Redman Coxe.[107]

The "Moral or Humane Society" was organized on December 29, 1817 by the Rev. John Monteith. Its objects were:

> to remove, as far as possible, the cause of poverty and disease, to secure the gift of the benevolent from prodigality, and to afford relief to the poor and distressed . . . . Detroit is to be divided into Wards or districts with a commissioner for each . . . to use constant vigilance so that there shall be no disorderly house, to suppress every species of vice, especially intemperance, gambling, profane language, violating the Lord's Day by business or amusement — also to ascertain and report any children, who through poverty may be destitute of education . . . to ascertain cases of sickness and distress, to endeavor to procure medical and religious aid.[108]

There were a number of religious societies, among them, "The Sunday School Association," formed in September, 1818, and the "Detroit Bible Society," of which Abraham Edwards and John Whiting were "managers."[109] A "Camp Meeting," held at Bloomfield on August 16, 1827, was an example of an essentially American social institution.[110]

Because Detroit and Michigan physicians played an important part in the Underground Railroad, it is interesting to note that the "Michigan State Anti-Slavery Society" was organized on June 28, 1836. Dr. A. L. Porter of Detroit was elected recording secretary in 1837, and Dr. Edwin W. Cowles was second vice-president of the auxiliary society of Detroit, when it was established in 1837.[111]

The Temperance Movement, inspired by the work of Dr. Benjamin Rush, gained in momentum with the founding of the "American Temper-

[105] *Detroit Gazette,* January 14, 1820. A Mechanics Union of Trade Associations, in Philadelphia, sponsored the first workingmen's party. Mechanics were interested in abolishing imprisonment for debt, but this was not accomplished until 1832 (Schlesinger, *op. cit.* 32, 134, 136).

[106] *Detroit Evening Spectator and Literary Gazette,* February 5, 1837.

[107] Philadelphia 1834 (Medical Science Department, Detroit Public Library).

[108] *Detroit Gazette,* January 9, 1818.

[109] *Ibid.,* November 14, 1817, January 7, 1820.

[110] *Michigan Herald,* Detroit, August 8, 1827.

[111] *Detroit Free Press,* June 5, June 12, 1837; *Pontiac Courier,* May 8, June 19, 1837; *Detroit Evening Spectator,* April 26, 1837.

ance Society," in 1826.[112] The National Convention, held at Philadelphia, May 24-27, 1833, declared that "the traffic in the use of ardent spirits is morally wrong," and that it sought "no affiliation with any party or other plan of benevolence." The subject of slavery was brought up, but it was decided that this controversial subject should not enter the discussion.[113] Judging from the newspapers, the full impact of the movement struck Michigan in 1830 and 1831. Temperance societies were formed in Ann Arbor, Dexter, Oakland County, Auburn, Ypsilanti, Panama, Bloomfield, Pontiac Township, and Detroit.[114]

Governor Cass was an ardent advocate of the cause, and addressed the Detroit Society, on November 25, 1830.[115] Dr. I. W. Richardson emphasized the purely ethical principles of temperance in a letter to the editor of the *Pontiac Courier,* on April 10, 1837. At the annual meeting of the Oakland County Temperance Society, in 1837, the question of "the adoption of the total abstinence pledge by members was to be discussed."[116]

The various reform movements had their effect on the personal life and health of the populace. The hygiene cult, fostered by Sylvester Graham (1794–1851), an ordained Presbyterian minister, flourished from 1830 to 1860. Graham advocated extending the principles of Temperance Reform to include reform in diet, exercise, clothing, and personal hygiene generally. Besides lecturing, mostly in the East, he wrote a number of books and pamphlets.[117] The *Monroe Times* of May 25, 1837 quoted a definition of "Grahamism" from a Boston paper, to wit: "The original founder of Grahamism was Nebuchadnezzer who eat grass like an ox." The *Marshall Times,* however, was influenced enough by the new propaganda to advocate frequent bathing.[118]

Graham's doctrines undoubtedly appealed to women, and were probably influential in producing the variety of magazines and books devoted to their health and beauty. Birdsall and Roosevelt, booksellers of Pontiac, advertised, under the caption "New Books," *Ladies' Medical Book, Young Ladies Own Book, Young Wife's Book, Mother's Own Book.*[119]

[112] Krout and Fox, *op. cit.* (see note 6, above) 263.

[113] *Journal of Health* 4(1833) 295-307.

[114] *Emigrant,* Ann Arbor, December 22, 1829, January 20, 1830, February 23, March 23, 1831; *Oakland Chronicle,* Pontiac, December 3, 17, 1830, February 25, 1831; *Pontiac Courier,* February 6, 1837.

[115] *Oakland Chronicle,* Pontiac, December 3, 1830.

[116] *Pontiac Courier,* February 20, 1837.

[117] Sylvester Graham, *Treatise on Bread and Bread Making* (Boston 1837); *Lectures on the Science of Human Life* (2 vols., Boston 1839); *Philosophy of Sacred History Considered in Relation to Human Aliment and the Wines of Scripture* (New York 1855); Pickard and Buley, *op. cit.* (see note 9, above) 222; Richard H. Shryock, *Development of Modern Medicine* (University of Pennsylvania Press, Philadelphia 1936) 247-48.

[118] August 11, 1837.

[119] *Pontiac Courier,* April 3, 1837.

A "best seller" in the Territory seems to have been *The Old World and the New, or a Journal of Reflections and Observations on a Tour in Europe,* by the Rev. Orville Dewey.[120] A review of this book quoted an excerpt, in which the Rev. Mr. Dewey declared, "[English girls] do not reason as our girls do, that to be pretty and 'interesting,' they must be livid, pale, and consumptive."[121]

The *Oakland Chonicle,* on October 15, 1830, thundered a dire warning at young ladies, probably totally unheeded:

> Stays. When will young ladies learn their own interest and discard this relique of barbarity from their dress . . . . Side ache, heart-ache and sorrow, pain and anguish inevitably follow this foolish, fool-hardy practice till at last consumption seizes upon the emaciated form and the grave has an early victim. Young ladies, abandon your stays.[122]

Subscriptions to the *Journal of Health* were accepted at the office of the *Democratic Free Press,* in Detroit. This journal appeared monthly from September 1829 to August 1833, at an annual subscription price of $1.25. It was conducted by an "Association of Physicians," and published in Philadelphia by Henry H. Porter, who also published the "Family Library of Health." In 1832, it was transferred to Samuel C. Atkinson, publisher of the *Saturday Evening Post.* At the time of its demise, the editors were Drs. John Bell and Francis Condie. Its prospectus best described its purpose:

> The *Journal of Health* will on all occasions be found in opposition to empiricism; whether it be in the form of nursery gossip, mendacious reports of nostrum makers and vendors, or recommendations of even scientifically compounded prescriptions, without the special direction of a physician — the only competent judge in the individual case of disease under his care . . . . The *Journal of Health,* it is hoped, will engage the attention and favor of the female reader whose amusement and instruction shall consantly be kept in view during the prosecution of the work.[123]

Its contents included articles on calisthenics (with delightful illustrations), diet, temperance, and public health.

Well might the *Journal* warn its readers against empirics. Under "Systems of Quackery," it enumerated the "Morisonian, Thompsonian, Hygienic [*sic*], Botanic, bone setters, and Homeopathists."[124] Scientific

[120] Snow and Fisk, Booksellers, Detroit, "Weekly List of New Works," *Pontiac Courier,* June 19, 1837.

[121] *Constantine Republican,* December 14, 1836.

[122] *Oakland Chronicle,* Pontiac, October 15, 1830.

[123] *Journal of Health* 1(1829) 2.

[124] *Ibid.* 4(1832–33) 359-61.

Medicine was on the threshold of the most revolutionary discoveries in its history, but, in the early years of the century, there seemed to be few dramatic advances to raise public hopes and faith, and confront the extravagant claims of the charlatan. Newspapers and other publications were used by the various cults and quacks to draw attention to shortcomings of the medical profession, especially its heavy medication, bleeding, and purging.[125]

David Ward (1822–1904), who studied medicine in his youth, and later became one of the state's lumber barons, related in his autobiography the treatment he received from Dr. Zina Pitcher, in 1840, for pleurisy. "Severe counter-irritation on the chest by means of Spanish fly blisters, tartar emetic irritations, setons to the right side and tartar emetic solutions taken internally three times daily."[126] In 1831, Dr. S. P. Hildreth (1783–1863), a prominent physician of Marietta, Ohio, sent the recipe for "Kittredge's Ointment" to William Woodbridge, Justice of the Supreme Court, at the time. The ointment was recommended for "rheumatism, sprained joints, broken bones, swellings, etc."

> Take fresh plantain, nightshade, elder leaves, mellilot (the latter indispensable), chamomill, henbane, poppies leaves and flowers, pond lilly roots, tobacco, mallows, yellow dock roots and apple of [?] or stramonium — of all these equal quantities — bruise them in a mortar and simmer with a little water over a slow fire in brass [?] for a few minutes — then add an equal weight to that of the plants of clean fresh lard and simmer till the juices and water are all evaporated — the extract of the plants remain in the oil which must be strained through a coarse cloth and put away in a stone jar ready for use.[127]

How simple and reassuring the following advertisement in the *Constantine Republican* of July 27, 1836, in contrast to the above treatment!

> Miles' Pills. — A few boxes of the Hygeian vegetable universal Medicine of the College of Health; which by removing all obstructions in the intestines; thoroughly cleansing the bowels; purifying the blood and thereby promoting its free circulation; strikes at the root of all diseases; in all cases of which it may be used with safety, and, if perservered in, with profit . . . a substitute for calomel.[128]

Not only did the increasing circulation of newspapers favor the spread of propaganda by the cults, but the patent law gave protection to their leaders. The first British patent act had been passed in 1624. Under the

[125] R. Shryock, *op. cit.* (see note 102, above) 315-17.

[126] Ward, *op. cit.* (see note 15, above) 47.

[127] "Letter to William Woodbridge from Dr. S. P. Hildreth, Marietta, Ohio," William Woodbridge, Papers, 1780–1861, Manuscript, Burton Historical Collection.

[128] *Constantine Republican*, July 27, March 1, May 31, 1837. "Miskin's Genuine Hygeian Pills" were also advertised in the same paper, July 13, 1836.

Constitution of the United States, Congress was given the power "to promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries." A patent law was accordingly passed, on April 10, 1790.[129]

Samuel Thomson (1769–1843) took advantage of this law to set up his "Thomsonian System." A farmer, born in Alsted, New Hampshire, he had lacked sufficient education to become an apprentice to a doctor. In 1800, he adapted some of the ancient medical theories to his own purposes, and created the System, which was based on the use of vegetable, or botanic, remedies, in conjunction with the vapor bath. He was opposed to the use of chemicals, especially calomel and other mercuric compounds, in common use at the time. Thomson took steps to monopolize his new field, in 1813, by having six of his remedies patented.[130] Patent rights were also extended to his disciples, on payment of a fee, and a certificate issued:

> This may certify that I have received of..... Dollars in full for the..... right of preparing and using the system of Medical Practice secured to Samuel Thomson by Letters Patent and he is thus constituted a member of the Thomsonian Friendly Botanic Society and is entitled to participate in its privileges.
>
> Dated..... .....Agent.[131]

In support of Thomsonian doctrines, the *Botanic Luminary,* a monthly periodical, was established in Saline, in July 1836, by Hiram Wright.[132] According to his obituary, Wright was an ordained elder of the Baptist denomination, and had come to Michigan in 1835. On his return to Ohio in 1837, Thomas F. Dodge and S. Wilson King became editors of the periodical. Agents were appointed in Detroit, Northville, Plymouth, and Monroe.[133]

On September 5, 1836, the annual meeting of the Friendly Botanic

[129] F. G. Underhay, "Patents," in *Encyclopedia Britannica* (London 1929) 17. 368.

[130] Samuel Thomson, *Narrative of the Life and Medical Discoveries, Containing an Account of His System of Practice and the Manner of Curing Disease with Vegetable Medicine* (5 editions, Boston 1822–29); *New Guide to Health; Or, Botanic Family Physician, Containing a Complete System of Practice upon a Plan Entirely New; with a Description of the Vegetables Made Use of and Directions for Preparing and Administering Them to Cure Disease, to Which is Prefixed a Narrative of the Life and Medical Discoveries of the Author* (2nd ed. Boston 1825); Kremers and Urdang, *op. cit.* (see note 38, above) 160; Pickard and Buley, *op. cit.* 172.

[131] From form used in Samuel Thomson, *Thomsonian Materia Medica, or Botanic Family Physician* (12 ed., Albany 1841).

[132] Copy in William Clements Library, Ann Arbor, Michigan.

[133] Solomon Davis at Detroit, Dr. A. Aldrich for Northville, I. W. Averill for Plymouth, E. Chamberlain at Monroe, *Botanic Luminary* 1 (July 1836) 16.

Society of Washtenaw County was held in Saline, and R. Edmunds elected president. A licensing committee of three was appointed. Wright represented the society at the United States Botanic Convention, held in Nashville, Tennessee, on October 17, 1836. In his report, he declared it to be the largest ever held with delegations from Kentucky, Tennessee, Ohio, Illinois, Georgia, and Alabama.[134]

Attempts to form a state organization were not entirely successful, although conventions were held in 1837 and 1838. However, a program was in prospect. A constitution was being drawn up, an "infirmary and seminary" were contemplated, and a committee was appointed to draft petitions for repeal of the "odious" medical laws of the state. The Thomsonians advocated that each "medical society regulate its own practice," basing their claims on a clause in the Constitution of Michigan that "no man or set of men are entitled to exclusive and separate privileges."[135]

In the issue of January 1838, the *Luminary* announced the establishment of a Thomsonian Infirmary at Adrian by its editors, Thomas F. Dodge and S. Wilson King, and stated that "Dr." Dodge, in three years' practice, had lost but four patients out of 500; "Dr." King, in two years' constant practice, had lost only one. These gentlemen were evidently not perturbed by the sensational trial of Richard K. Frost, in New York, held responsible for the death of Tiberius French, a teacher at Columbia University. Frost was the proprietor of a "Thomsonian Infirmary," and was accused of administering certain Thomsonian remedies. The jury brought in a verdict of manslaughter in the fourth degree, recommending clemency.[136] The *Constantine Republican* commented, in reporting the case, "Dr. Frost has been held to bail for $5000 for steaming to death a Mr. French."[137] Several months previously, the paper had featured a long, satirically humorous account entitled, "The Autobiography of a Steam Doctor."[138] Thomsonian ideas are blazoned from the pages of Territorial newspapers. Whether the promoters of the numerous "vegetable" remedies were followers or imitators of Thomson, they made use of his jargon to sell their products. There were "Butler's Vegetable Indian Specific," Searl's Vegetable Bilious Pills," "Vegetable Universal Pills," "Moffat's Vegetable Life Pills," "Potter's Vegetable Catholicon," "Vegetable Rheu-

[134] *Ibid.*, November 1836.

[135] *Ibid.*, 1(August 1836) 23-24.

[136] *Ibid.*, 2(February 1838) 36-42; John U. and C. G. Lloyd, *Life and Medical Discoveries of Samuel Thomson, and a History of the Thomsonian Materia Medica* (Bulletin #11, Reproduction Series #7, Lloyd Library of Botany, Pharmacy and Materia Medica, Cincinnait 1909).

[137] November 15, 1837.

[138] By John H. Watts, April 19, 26, 1837.

matic Drops," "Dr. Chipman's Vegetable Anodyne," and "White's Vegetable Toothache Drops," to mention only a few.[139]

It is not strange that some physicians questioned the orthodox medical practices of the day, and turned to the doctrines of the cults for better methods of treatment. Perhaps new fads attracted others of the profession. Be that as it may, among the "professional cards" listed in the *Botanic Luminary,* are the names of P. J. Spalding, A. Barnard, and E. D. Post of Adrian, all of whom were licensed by the Territorial Medical Society.[140] Commenting on the progress of Homeopathy, and the "decline" of the medical profession in Michigan, in 1849, the editor of the *Michigan Journal of Homeopathy* stated that Drs. Edwin W. Cowles and Daniel O. Hoyt, former members of the Territorial and State Medical Societies, were warm advocates of Homeopathy.[141]

A book, published in 1833, combining a number of theories and systems with simplicity and comprehensiveness, must have seemed a welcome solution of the medical problem to the bewildered frontiersman, whose self-reliance had met the test of circumstances in many a crisis. *The Improved American Family Physician; or Sick Man's Guide to Health: Containing a Complete Theory of the Botanic Practice of Medicine on the Thomsonian and Hygeian System, with Alterations and Improvements. To Which is Appended a Concise Formula for Compounding Medicine for the Cure of Every Complaint Incident to Human Nature, Also a Complete Digest of Midwifery so that the Old Proverb May be Verified, that "Every Man Be His Own Physician."* [142]

Medical sects waxed and waned. The Territorial Medical Society continued its functions, when Michigan achieved statehood in 1837, although

[139] *Michigan Herald,* Detroit, February 28, 1827; *Democratic Free Press,* Detroit, November 28, 1832; *State Journal,* Ann Arbor, August 10, 1837; *Detroit Evening Spectator,* January 25, 1837; *Detroit Free Press,* June 12, 1837; *Michigan Whig,* Ann Arbor, January 15, 1835; *Monroe Times,* May 25, 1837.

[140] Henry B. Shafer, *American Medical Profession, 1783–1850* (Columbia Univ. Press, New York 1936) 235; *Botanic Luminary* 2(June 1838); Parey J. Spalding, from State of New York, Licensed on April 13, 1833; Abner Barnard, licensed August 15, 1841; Erasmus D. Post, attended Castleton Medical College, licensed February 10, 1835.

[141] *Michigan Journal of Homeopathy,* 1(May 1849) 78. Edwin W. Cowles served as secretary and censor of Territorial Medical Society. Name mentioned in *Constitution and Proceedings,* Michigan Institute of Homeopathy, 1847; called "roving homeopath." Practiced in Cleveland, 1832, went to Detroit in 1834, returned to Cleveland, 1838, signed "Table of Fees," printed in Cleveland, Howard Dittrick, "Cleveland Doctors' Fees about 1840," *Ohio State Archives and Historical Quarterly* 54(1945) 364. Daniel O. Hoyt, censor of Territorial Medical Society in 1835, Vice-president in 1836.

[142] New York 1833. The preface mentions "Dr. Morison, The Hygeist," and "James Morison of Great Britain."

it was constantly being deprived of its privileges by "amendments" and changes in the basic law. By 1835, a wave of repeal of state laws similar to that of Michigan had set in.[143] New York repealed the regulatory functions of the State Medical Society in 1844, and the medical law of Michigan was repealed *in toto* by the State Legislature, in 1851, with the full consent of the members of the Medical Society.[144]

One of the reasons for the failure of state societies as regulatory agencies was the encroachment upon their prerogatives by the various sects, which also formed societies and also claimed the right to grant licenses, but perhaps the best explanation was offered by Dr. Zina Pitcher, a member of the Michigan Medical Society from 1835, and president in its declining years:

> The history of this society furnishes one evidence of a general truth, which is, that the legislation of a government, deriving its powers from the consent of the governed, in order to have any binding validity, must be an exposition of the popular sentiment, however erroneous that sentiment may be.[145]

[143] Shafer, *op. cit.* 209. Not until 1899 was an adequate law passed for the regulation of medicine in Michigan.

[144] Zina Pitcher, "Notice of the Territorial and State Medical Society of Michigan," *Peninsular Journal of Medicine and the Collateral Sciences* 1(May 1854) 500-506.

[145] *Ibid.* 1. 505.

# Antiques of Medical Interest

## TOOTH BRUSH SET, SILVER, LONDON, 1799

T. G. H. DRAKE*

WHILE many references regarding the composition of dentifrices before the year 1800 may be found in medical literature, early descriptions of apparatus for their application are very uncommon. Pliny advised the ash of a mixture of barley, salt and honey; fig tree ashes; powder or ash of hart's horn; bone ash mixed with myrrh; ash of hare's head, with or without ash of mice and rats' heads; ash of ankle bones of goats or other domestic four-footed beasts; or calcined egg shell, "to make the teeth look white, and the breath to smell sweet." In *The harangues or speeches of several famous Mountebanks in town and country,* London, n.d. (18th century), the quack's claims for his dentifrice are recited, "Here is likewise a powder . . . the very powder that made Venus a goddess [given her by Apollo] that kept her perpetually young, cleared her wrinkles, firmed her gums, filled her skin, coloured her hair." This powder the quack had "extracted to a quintescence; so that wherever it but touches in youth it perpetually preserves, in age restores the complexion, sets your teeth as firm as a wall, makes them white as ivory that were black as jet." The famous powder had also other strange and interesting effects, "with the addition of a most wonderful bath of my own preparation, it will tinct a grey hair a pure auburn and make it grow so. This powder has likewise a wonderful variety of amorous effects belonging to it which are not here to be enumerated."

Pierre Fauchard, the father of modern dentistry, stated that little or no care as to the cleanliness of the teeth is ordinarily the cause of all the maladies that destroy them. In the *Chirurgien Dentiste,* Paris, 1728, he advised against the commonly used dentrifices containing either one or more components, such as brick, porcelain, pumice stone, calcined talc, calcined alum, etc. which, "though so commonly used without doubt do more harm than good," and "the juice of sorrel, lemon juice, spirits of vitriol and of salt which not only are apt to colour the teeth but also destroy the enamel and encourage caries." He recommended the use of tooth powder or paste only if it were impossible to keep the teeth clean

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by washing the mouth every morning with tepid water and rubbing the teeth up and down, inside and outside, with a small very fine sponge wet in water, or water with a fourth part of aqua vitae added. The dentifrice to be used, if necessary, was "a mixture of coral, dragon's blood, burnt honey, seed pearls, cuttle fish bone, crayfish eyes, bol d'armerie, terre sigillee, terre hematite, canelle, calcined alum, the whole reduced to a very fine powder and mixed together."

Tooth brushes had come into use by 1728, since Fauchard cautions, "Those who use little brushes or morsels of cloth or of linen to whiten and clean the teeth use them without knowing that all these materials are too rough and that their frequent usage practiced indiscriminately destroys the gums and the teeth." He favored the use of the sponge, or "convenient to rub the teeth is the well prepared tip of the root of the marsh mallow which whitens the teeth without hurting the gums." The roots went through a long preparation to preserve them sweet and soft: cutting in the autumn, drying, removal of outer skin, soaking in warm almond oil, to which aromatic herbs had been added, for 8 to 10 days, and placing over a charcoal fire for 24 hours, to render them redder and more perfect, in a mixture of dragon's blood, gum lacque, and rectified spirits of wine.

Joannes Arculanus had already in 1542 recommended the use of wooden spuds for dental hygiene:

> The teeth must be cleaned, at once, after every meal, from the particles of food left in them; and for this purpose must be used thin pieces of wood somewhat broad at the ends, but not sharp pointed or edges, and preference should be given to small cypress twigs, to the wood of aloes, of pine, rosemary, of juniper and similar sorts of wood which are rather bitter and styptic; care must however be taken not to search too long in the dental interstices and not to injure the gums or shake the teeth.

In Figure 1 is shown a tooth brush set in sterling silver, manufactured in London in 1799. The three articles are fitted snugly into a red leather pocket case. In the brush socket (of a size favored by the modern dentist) would in the original state be inset a block of wood, in which the bristles are inserted. The thin spatula probably was used for scraping the tongue. The dentifrice container is closed by tight fitting lids opening on a central pivot.

The handle of the tooth brush and the dentifrice box bear the London hall marks for the year 1799 (Fig. 2). One of the most satisfactory things

connected with old British silver is that through the presence of these hall marks, which have been in use for the last five or six hundred years, the date of manufacture and the local origin of articles can be traced. The Goldsmiths Companies in certain of the principal British cities are empowered and required by statute to carry out and where necessary to enforce the provisions of the hall-marking enactments which are a guarantee of the fineness of the silver. The silver article after being stamped by the marker with his initials (1) is submitted to the Goldsmiths Company, where after scrapings have been assayed for silver content the hall marks are applied. The town mark, the leopard's head (crowned before 1822, uncrowned since) (3) is indicative of London manufacture; the fineness mark, the lion passant, (2) guarantees silver of old sterling quality, that is 92.5% silver, and the reigning sovereign's head (5), impressed from 1784 to 1890, denotes payment of government duty, which was collected during this period. The single letter (4) is the date mark, that is, the year assayed and stamped. The character of the script and the shape of the enclosing shield must be observed as well as the letter. The script and shape of shield remain constant for 20-year cycles, the letter changing from year to year during each cycle. Thus the illustrated script and shield are common to London ware of the period 1796 to 1815, the letter "D" denoting hall marking in 1799.

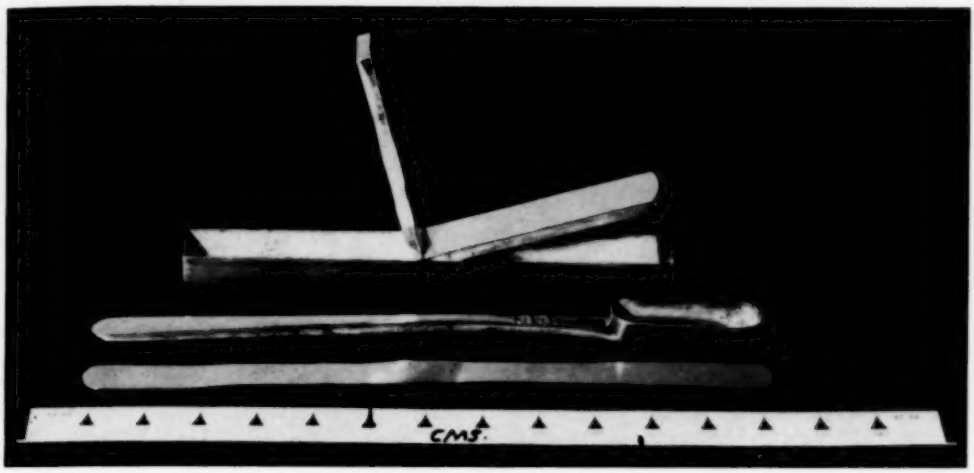


FIG. 1. Tooth Brush Set, Silver, 1799.

FIG. 2. Hall marks, London, 1799.

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# William Harvey (1578-1657)

## HIS APPLICATION OF BIOLOGICAL EXPERIMENT, CLINICAL OBSERVATION, AND COMPARATIVE ANATOMY TO THE PROBLEMS OF GENERATION

H. P. BAYON*

### INTRODUCTION

A FEW years ago, a scientist told me that *De generatione* was but too aptly entitled, for it revealed the last infirmity of a noble mind—the degeneration of old age. The sentiment of this sally was not new, for Jan Swammerdam (1637–1680) had already censured Harvey because in his senile decrepitude he had incoherently mixed truth and error, falsity and accuracy (*Historia insectorum generalis,* Utrecht, 1699). It is usually accepted that Harvey wrote his third book in his seventies, shortly before 1650, when, yielding to the friendly insistence of Sir George Ent (1604–1689), he allowed *Exercitationes de generatione animalium* to be published.

Instead, judging from remarks in Exercitation VI — Harvey had helped Fabricius in Padua with the observation of hatching eggs—that could not be later than 1602. Embryonal chicks were mentioned in the *Prelectiones* which were penned before 1616; further references to chick embryogeny occurred in Chapter IV of *De motu* (1628); experimental observations on does in the Royal Parks were performed "during a long series of years" about 1633. John Aubrey (1626–1697) recorded that Harvey examined hatching eggs in Oxford in 1642, his papers on the generation of insects were destroyed in the riots in London during his absence in the service of King Charles I—therefore approximately 1642–1644. Sir Kenelm Digby (1603–1655) in *Two Treatises* etc. (London, 1645, Chap. XXIII, p. 275) mentioned Harvey's examination of pregnant "does and hindes." Thus it can be reasonably assumed that in the course of half a century, Harvey succeeded in collecting observations which he brought together into a coherent script, that Ent obtained in December 1650 and edited, so that it appeared in print in March 1651. Though, as we learn from "The Epistle Dedicatory," Ent greatly admired the text,

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calling it "A work framed and polished with very great pains," it reveals some contradictions, several repetitions, and numerous ambiguities. The book was published during a time of prolonged political commotion, when the author was 73 and may have lacked the energy to revise a script, however conscious he may have been of its flaws — or what is worse, when he was not inclined to modify or test ingrained opinions; for it must be admitted that the real merits of the work are often clouded by superfluous dialectical verbiage.

Whatever the reason—or reasons—it must be allowed that *De generatione* (1651) has not been noticed or praised like *De motu* (1628); indeed, these painstaking embryogenic researches have been neglected by Harveyan orators and others. When approval has been granted, it has usually been because of a misquotation of the dictum on the frontispiece of the 1651 edition: *Ex ovo omnia,* which does not really reflect the extent of Harvey's investigations and results. Thus Meyer-Steineg and Sudhoff (1922, p. 310) wrote: "die Aufstellung des Satzes *'omne vivum ex ovo'* machte mit einem Schlage all den phantastischen, früheren, Zeugungstheorien ein Ende." As a matter of cold fact, the *emboitement* hypothesis continued to obtain support during many years, while the lively controversy between ovists and animalculists persisted until the nineteenth century.

In Garrison's *History of Medicine* (4th ed. Philadelphia, 1929, p. 248) it is said: "The status of Harvey's other treatise *De generatione animalium* (1651) is important in the history of embryology and a matter of frequent dispute. Some writers have tended to make Harvey's merits overshadow the just claims of men like Malpighi and von Baer." Garrison also misquotes Harvey's dictum, which — it is said — was first stated by Redi as *omne vivum ex vivo;* it should be recalled that the *Esperienze intorno alla generazione degl'insetti* was not published till 1668.

## I. Recent Criticisms of Harvey's Third Book

The interest in Harvey's *De generatione* has lately been revived, but a comparison of its results with those achieved by *De motu* has usually produced a somewhat acid verdict. For example, Cole (*Early Theories of Generation,* Oxford, 1930, p. 134:

It is difficult, almost an invidious task to review Harvey's work on generation. His demonstration of the circulation of the blood gives him such an exalted position in British Science, that we are almost tempted to forget his work on

generation — in which the great man was making an heroic, and almost a pioneer attempt to solve a problem wwhich was insoluble by his generation, or for that matter by ours. Hence it is inevitably a record of failure.

In all fairness it can be said that Cole admits (p. 140):

Nevertheless it was Harvey that gave the initial impetus to that long series of researches, which discovered in his dictum a profound truth of which he himself was but dimly conscious.

Joseph Needham in *A History of Embryology* (Cambridge, 1934) obtains a much more favourable opinion of Harvey's studies of embryogeny; for after careful study of the text he lists Harvey's main achievements under 10 headings, which seem to correct previous understatement.

Arthur William Meyer in *An Analysis of the 'De generatione animalium' of William Harvey* (Stanford University and London, 1936) scrutinizes Harvey's text and considers the divergent opinions of Cole, Needham, and others; with commendable impartiality Meyer refrains from accepting wholeheartedly the conclusions of either of these doughty contendents. Meyer deserves praise for examining the descriptions of Harvey's experiments on gravid *cervae et damae* and comparing them with those of modern authors like Bischoff (1854), Bonnet (1884), Keibel (1899 and 1901), and by explaining where the latter agreed with, and where they differed from Harvey, shows clearly why and how he obtained erroneous conclusions. A fair account of Meyer's verdict cannot be obtained by random samples, but on p. 144 he appears to quote approvingly Ormerod (1908) who wrote that "whilst *De motu* arose complete, conclusive, victorious like Pallas from the Head of Jove, instead in *De generatione* we witness his painful and laborious searchings after truth."

Quite lately, in 1942, the Cornell University Press published a facsimile of the embryological treatises of Hieronymus Fabricius of Aquapendente (1533–1619), with an introduction, a translation and commentary by Howard B. Adelmann, Cornell University. This is an admirable piece of work, because the author has a sound knowledge of the subject and takes considerable trouble in obtaining accurate biographical details.

The opinions expressed in Harvey's *De generatione* receive frequent and careful attention; the conclusion is (p. 121):

Harvey built upon foundations laid by Fabricius and so in some cases approximated more closely the truth as we see the truth today; but Fabricius no less than Harvey contributed to its slow advance. Both struggled with problems far too

difficult for their age to solve, but both contributed documents precious to the history of biology.

Any attempt to explain the meaning of a serious text by the quotation of few lines usually results in being grossly unfair, if not impertinent; but the main conclusions of Adelmann's remarkable book seem to be condensed in these sentences. Adelmann is justly entitled to decide between the respective merits of the Paduan professor and the English physician, since his readable sketch of the state of embryological knowledge before Fabricius is both accurate and well documented.

It may sound presumptuous to express an opinion differing from that consistently evolved during three centuries; yet, it has seemed to me that a clearer consideration of the incentive provided by Harvey's writings; a better knowledge of the factual and anatomical information available for his use; a fairer recognition of his patient and prolonged reasonings; a touch of personal sympathy for the pitfalls of biological experimentation, and a lucid comparison of the relative difficulties and extent of the problems involved — all this would help to clarify the results achieved, explain the faulty conclusions obtained, and suggest the verdict that *De motu* is not really superior to *De generatione* — for both are as good as Harvey could make them and both are different, but remarkable, milestones in the progress of biological knowledge.

## II. The Alleged Superiority of *De motu* over *De generatione*

Since Harvey's work on embryogeny has been frequently slightingly compared with that of the demonstration of the circulation of the whole blood, a little thought may be expended in attempting to ascertain whether this supremacy can be supported by a critical examination.

In the first instance a great deal of meshless fustian has been woven by many authors on the presumed anticipation of a description of the circulation of the blood by Hippocrates, Galen, Rabelais, Serveto, Rudio, Cesalpino, and many others besides. Sciolism verging on absurdity was revealed by Giambattista Ercolani (1817–1883) who placed a tablet on the walls of the Veterinary Institute of Bologna recording that the lawyer Carlo Ruini had been the first to discover the circulation of the blood. This is scarcely the opportunity for a renewed debate of the trite question; but it may be mentioned that the lecture notes by a pupil of Cesalpino have been preserved in the Bodleian at Oxford; from these can be learned

that Cesalpino taught that the word *circulatio* meant the to-and-fro movement occurring in a cooler on top of a boiling vessel (Fig. 1). In this particular instance, Cesalpino believed that the ebullition was caused by the innate heat of the heart and that the valves of the heart preserved the heat. He did not mention the presence of *ostiolis*=valves in the veins. Better bottomed — as Harvey would have said — is the assertion that Harvey obtained his first notion of the circulation from Fabricius, though even this is, demonstrably, a superficial conclusion. Fabricius published a description of the valves in the veins in *De venarum ostiolis* (Padua, 1603) in which he said that the valves helped the to-and-fro movement of the blood by preventing an accumulation of blood in the lower limbs, for he believed that the venous blood flowed from the heart. In 1688 Robert Boyle (1627–1691) mentioned a conversation with Harvey, in which he said that his first notion of the circulation was obtained by noticing how the valves were so placed as to oppose the venous blood from flowing towards the heart. It should be remembered that in the lecture notes which Harvey wrote about 1616 he based his views on the presence of clacks or valves in the heart, which acted as those of a pump to raise water. This is essential, because in the opinion of Fabricius — and other Galenists — the heart was passively expanded. It is true that Harvey copied one of the illustrations of Fabricius, but added three of his own to show the right working of the *ostiolis* in the arm. Any modern physiologist would act likewise: if he wished to clarify a debatable thesis, he would reproduce his opponents' illustrations and demonstrate their correct interpretation by additional figures and tests. Thus the assertion that Fabricius taught the circulation of the blood to Harvey is palpably erroneous. The contrary holds good — the Paduan professor propounded the Galenical movement of the blood and if he ever heard of his pupil's new theories, no doubt poured scorn on the "*fisime del piccolo inglese.*"

Where Harvey failed in achieving conclusive results in *De motu cordis* (1628), and also later, is well known and admitted: he did not succeed in proving the existence of capillaries, though he performed experiments that should have convinced him of their existence; even careful dissection would have revealed them. He refused to accept the lacteals of Gaspare Aselli (1581–1626) published in *De lactibus* (Milan, 1627), though they were evident enough; in fact Harvey had seen them. He obtained only the

haziest idea of the connection between the circulation of the blood and breathing, though both Colombo and Serveto had apparently grasped the importance of the aeration of the blood by the lungs.

Such are the main flaws of *De motu* and the doctrine of the circulation as propounded by Harvey; but so much was achieved by sound, original experimentation combined with correct observation, and so bravely were the conclusions maintained against a conspiracy of silence during nine or more years, followed by twelve years of active opposition, that such defects can scarcely reduce the appreciation of Harvey's work.

The first to admit in print the truth of the Harveyan circulation was the physician Robert Fludd (1574–1637) in *Integrum morborum mysterium* (Frankfurt, 1631, p. 11).

Reverting to the subject of Harvey's investigations of the problems of generation, for a clear conception of Harvey's achievements some knowledge should be obtained of his background of the soil, atmosphere where he lived and worked, so as to ascertain what progress he initiated in the matters he studied.

## III. Doctrines of the Medical Faculty of Padua in the Early Seventeenth Century

In the years between 1598 and 1602, when Harvey studied at the University of Padua, it was the most advanced centre of medicine and natural philosophy then known. It can be doubted whether Harvey profited from the lectures during the first half-year, because, though Latin was a *lingua franca* among the learned, the pronunciation of his Italian lecturers would have been unintelligible to a Cambridge scholar of the time. That so many Anglicans, Lutherans, and other Protestants studied at Padua was due to the broad-minded statutes of the "fair Mother of the Arts" which required no confessional declaration of the graduates. Under Geronimo Fabricio da Aquapendente (d. 1619) Harvey would receive the most inspiring tuition available; for Vesalian anatomy would be alive, even if still shackled by doctrinal tradition. True, Galen had been shown to have been wrong in many of his descriptions, owing to the fallacy of believing that the features present in the inner organs of animals must also occur in man without noticeable modification, but nonetheless his authority (and some of his mistakes) was accepted in wide academic circles, for comparative anatomy was still in its infancy. Even Fabricius had not fully grasped the observations of Gian Filippo Ingrassia (1510–1580), Bar-

tolomeo Eustachio (1520–1574), Gabriele Fallopio (1523–1562), which showed anatomical differences between the homologous organs of various animals, rather than construing an identity in appearance. The authority of Aristotle, Hippocrates, and Pliny was still unassailed in many matters; this is noticeable in the writings of Fabricius, because every time he had to expound some feature described by a classical author, the professor was very careful not to contradict, but modified with many words the ancient description. The porosity of the cardiac septum according to Galen was being taught by Fabricius and Rudio. This porosity, apart from serving to strain the blood, probably had been observed in the heart of cattle, where there are numerous small cavities — which of course do not pass right through the septum.

In Padua, Harvey would be taught to accept a strange correlation between male and female sexual organs; thus the uterine cervix would be made to resemble the *glans penis* as much as actual appearances would allow. The ovaries of mammals were considered to be female testes; their function was grossly misunderstood, for it was taught that they elaborated the female semen, which we now know as the product of vulvovaginal glands.

As to the constitution of sperma, the possibility of its containing corpuscular elements was not even faintly suggested; it has been noted by Le Double (1899) that Rabelais wrote that Quaresmeprenant *avait les genitoires comme des clous* — and spermatozoa vaguely resemble nails; but this is no more than a literary curiosity, for if Rabelais had seen spermatozoa he would have said so, clearly and unambiguously.

Instead, the presence of a vapour or spirit in male semen was often mentioned — for example it is found in Serveto's *Christianismi Restitutio* (1553). This opinion, it will be seen, must have misled Harvey in his investigations. The production of sperma by the testes (if and when admitted) seemed most mysterious, as indeed it is, even with all our knowledge of cytological spermatogenesis; but several reasons were available to explain the conception of the sexes, the inheritance of the characteristics of father or mother.

In relation to the phenomenon of conception, two hypotheses were available: the Aristotelian doctrine, sperma+menstrual blood; or the Galenical teaching that it was due to the mixture of male and female semen, the varying proportions of which produced male or female.

On the authority of several classical authors it was universally be-

lieved that quails, vultures, and — under certain circumstances — mares, or even women could be fertilized by the wind. In relation to poultry, the existence of wind-eggs was known; these were unfertile eggs obtained without the concourse of a cock-bird. A good review of the subject is given by Conway Zirkle in his paper, "Animals Impregnated by the Wind," *Isis,* 1936, XIV, 95–130. This author mentions Harvey on pp. 114 and 129; in the latter instance Harvey is listed as having described the wind impregnation of hens — not quite correctly, in my opinion.

Fabricius did examine hatching eggs, and noted how difficult it would be for the semen to reach the ovary through the many folds of the oviduct; this difficulty gave rise to the suggestion of Fabricius that the cock's seed was stored in the small blind crypt in the end gut of fowls — later known as *Bursa fabricii* — whence it could fertilize the eggs during a whole year, presumably by means of an *aura seminalis.* This seems to have been the origin of the hypothesis formulated by Harvey in later years.

The current notions about contagion require attention, because Harvey compared fertilization with contagion — the latter being something quite incorporeal. It is known that Fracastoro in his *De contagione et contagiosis morbis et eorum curatione* (Venice, 1546) had made some most remarkable assertions about the concentric spread of the *seminaria contagionis,* remarks which could easily persuade the modern reader that Fracastoro had actually seen the microbes issue forth from the ailing, attach themselves to the healthy, and communicate the same disease to them. Then, though Fracastoro can be understood to say that the *seminaria* were living, he would not distinguish between living cells and inanimate particles — for could not mud procreate gnats or even frogs? We now appreciate how advanced and farseeing Fracastoro was; but it is not apparent that wide medical circles were at all impressed by the *seminaria.* Plague, pestilential fevers, and leprosy were considered infectious; but so was epilepsy, whilst lice and scabies did not spread from person to person, but were generated by dirt on the body. A difference was made between the infection from person to person, e.g., in syphilis and the outbreak of epidemics; the latter were due to the weather or winds or the stars. Robert Fludd had a picture showing the healthy Christian protected by angels against verminous attacks — but he was an exception.

Then, if he ever read Fracastoro, Harvey would probably remember sentences like: "Lippitudinis genus est quo qui laborat omnes solet in-

ficere, qui in ipsum spectant" (p. 18), that is: "There is an eye disease which infects all that look upon it." Or he would consider Chapter XI where the deadly properties of a glance from the "catablepha"— a fabulous animal from Pliny — are mentioned. Harvey could not do otherwise; he had been taught in the last years of the sixteenth cenutry, and lived in the first half of the seventeenth and was well acquainted with the work of William Gilbert (d. 1603), author of *De magnete* (1600). Thus it occurred that Harvey compared the production of an "egg" by sperma, as being the result of the conjugation of cells or *seminaria* he could not see, rather than as due to the distant action similar to electromagnetism.

The text of *De contagione* etc. (1546) has been consulted in the edition of Wilmer Cave Wright (New York, 1930). Fracastoro's opinions are clearly explained by Charles and Dorothea Singer in "The Scientific Position of Girolamo Fracastoro (1478–1553)," *Ann. Med. Hist.* 1917, I, 1–34.

## IV. Contributions of Fabricius to the Knowledge of Fœtal Anatomy

Modern anatomy is based on the text and illustrations — or should it be illustrations and text?—of the *De fabrica* etc. (Basel, 1543) of Andreas Vesalius (1514–1564), whose fundamental work was a striking example of the immense importance of printed figures and script in the development of the biological sciences because botany, zoology, and their many allied branches of natural philosophy, could not advance without accurate records and illustrations. Contemporary scholars can rely on the printed word; but in the Middle Ages the student was oft misled by garbled or pseudo-epigraphic copies.

In relation to fœtal anatomy, Vesalius had considerable difficulty in obtaining the requisite material and so it occurred that he described the annular placenta of a dog as occurring in man. It was that accomplished exaggerator, Realdo Colombo (d. 1559), who soon corrected this mistake of his teacher. Colombo apparently suggested the name "placenta" and stressed that the fœtus is nourished from the umbilical vein though he adhered to the ancient mistake that the heart of a fœtus did not function.

Among the forerunners of Fabricius in the embryological field, two deserve special notice: Ulisse Aldrovandi of Bologna (1522–1605) whose

"Ornithology" was published 1599–1603 and the Frisian, Volcher Coiter (1534–? 1600) a wandering scholar, who visited many universities and published the first daily observations on the development of the chick in 1578. His account is sober and free from those rhetorical lucubrations which distinguish many works of the time.

Fabricius began teaching in Padua in 1566, but it was not until 1600 that his first anatomical work was published; his *De formatione ovi et pulli* appeared in 1621, therefore posthumously, with some of the illustrations imperfectly described. Perhaps these works also deserve to be qualified as "senile meanderings"—a reproach that has been made in relation to Harvey's book of 1651. Needham (1934) doubted whether the anatomical advances in embryology recorded by Fabricius were not counterbalanced by the erroneous theories he invented.

The task of deciding whether Fabricius added to the knowledge obtained by Aldrovandi and Coiter is greatly simplified by Adelmann's work (1942), which includes an excellent index. Moreover, one can rest assured that any achievement of Fabricius will not be overlooked by his thorough biographer. Nonetheless, it is remarkable that Adelmann (p. 23) quotes Fabricius as having said in the dedication of *De voce* (Venice, 1600) that even Vesalius had his failings, for he sometime wandered off too far from his subject and wrote too discursively; further that he confined his treatment almost entirely to a description of the parts, neglecting the functional aspects of anatomy. There is more of this criticism of Vesalius, which, however justified, could equally well apply to Fabricius. Evidence can be found in most chapters of *De formato foetu.*

In any case, we learn from Adelmann on p. 112 that it is possible to estimate Fabricius's achievements as an embryologist by emphasizing his strength as an observer, rather than dwelling on his defects as an interpreter, for his errors dogged him through centuries. Thus it should be set down to his credit that he was the first to call attention to the *cicatrix;* that he discovered the *Bursa fabricii;* that he gave the best description of the reproductive tract of the hen available up to his time, and that he was the first one to establish with some approach to correctness the role played by the ovary and oviduct in the formation of the hen's egg. He gave the first illustrations of the chick's development and depicted in remarkable detail and with considerable accuracy most, if not all, of the structures described by the writers of the seventeenth century. He was the first clearly to differentiate the diffuse placenta from other types. He introduced a

classification which conforms closely to our modern ideas and gave us a set of illustrations not without value in our time, coining a number of new terms, and placing useful expressions at the disposal of his followers.

Then Adelmann (p. 106) says that the Paduan professor was the first to describe and to illustrate in print the chorionic villi and uterine crypts in the horse, pig, and ruminant; the first to observe the human decidua; the first to present a reasoned classification of the various forms of placenta, whilst his illustrations far surpass in accuracy and beauty any previous attempts.

Adelmann (p. 113) concludes: "And perhaps most important of all, he handed the torch to a brilliant student, William Harvey, who took it up and carried it a little further along the way."

Quite apart from comparisons being odious, it seems a difficult and somewhat unprofitable task to decide whether Fabricius or Harvey, each in his time, contributed more to the advancement of biological knowledge. To my mind, it would be more feasible to examine their works and then to ascertain what happened to the doctrines they propounded. Obviously, the Paduan professor and the English court physician worked in quite different surroundings and had to convince audiences that were unlike in receptivity and critical understanding; therefore, for these reasons and others, Fabricius and Harvey cannot be fairly compared, though the relative importance of their lasting achievements can be assessed.

A start can be made by considering the attitude of both these great teachers in relation to the problems of equivocal generation and by seeing what followed on their pronouncements.

## V. Unshaken Belief in Spontaneous Generation in Harvey's Time

The spontaneous, autochthonous generation of plants, frogs, eels from mud, fleas, lice, and other vermin from dust or dirt, maggots, flies, bees from refuse or rotten meat, scorpions under stones, etc. was universally believed — by all and sundry. I cannot trace the least doubt on the subject of equivocal generation before Harvey in 1651. Edmund von Lippmann in *Urzeugung und Lebenskraft* (Berlin, 1933) mentioned on p. 56: "... der jurist Bodin aus Angers [der] die Urzeugung unbedingt bestreitet, wo er auf sie zu sprechen kommt, ist eine der Erwähnung werte Ausnahme." In the *Colloque de Jean Bodin* etc. edited by Roger Chauviré (Paris, 1914), which is a French translation of the MS of the *Colloquium hepta-*

*plomeres,* in a discussion on the Virgin Birth, the following occurs (p. 145).

> Nous voyons que non seulement des racines et des animaux en très grande quantité sortent du sein de la terre sans semences aucunes mais aussi des hommes dans vne terre grasse temperée par la chaleur du soleil, selon les tesmoignages d'Anaximandre, d'Empedocle, d'Anaxagoras, de Platon et de tous les philosophes arabes au dire de Auicenne. Entre les historiens Diodore Sicilien, Pausanias, Justin, Strabon & mesmes Aristote lont creu. Sans parler des poetes dans les escrits desquels il ny a rien de plus frequant. Comme aussy M. Varro, Pline, Solin, Columella et Sillius Italicus raportent que les cauales de Portugal concoiuent & engendrent souvent sans leur masles, mais que les poulins qui en sortent ne viuent pas plus de trois ans. Il est incroyable, dict Varron, mais cependant veritable que les cauales de Portugal concoiuent par le moyen du vent.

There is more of a similar nature. Even though Jean Bodin (1530–1596) was a lawyer, still that is a fair résumé of the problem as it would present itself to the mind of Harvey.

Avicenna had the story of a half-formed calf falling from heaven, and those biblically inclined could quote Exodus VIII, 17: All the land became lice—or Psalm CV, 30: Their land brought forth frogs. Sir Kenelm Digby (1608–1665) believed that nettles could be burnt to ashes and that the ashes could then produce new plants — an observation with which every gardener will sympathize. Even Galileo Galilei (1564–1642) in his *Dialogo dei due massimi sistemi* (Firenze, 1632) asked: "How does Nature go to work to produce out of must-fumes hundreds of thousands of little flies?" No answer was vouchsafed.

Adelmann underlines what is admitted by those who have studied Harvey's writings — that Fabricius was an "ovist" even before his pupil; but quite naturally Fabricius was a wholehearted believer in spontaneous generation, of which he gave examples in Cap. 3 -*Cur alia oua heterogenea, & organica sint: alia homogenea, similiaria.* He explained that little toads arise on the bank of streams from dust moistened by summer rains; since they were quickly produced by the vehemence of the causes, so likewise they soon perished. He then instanced wine-flies (*musciolini*) which suddenly become flies from grubs, because otherwise they would not be suitable as food (?). No further quotation is required to prove Fabricius a convinced supporter of the classical tradition.

## VI. First Doubts about Abiogenesis, or Equivocal Generation

Several modern authors have attempted to ascertain whether Harvey accepted or denied the generation of plants and animals from mud or putrefying matter, without the presence of seed or seminal matter. This is an important point, because if Harvey really believed *Ex ovo omnia* then he could not admit that shapeless mud or putrefying matter could generate living animals and, what is more unreasonable, accept their origin and development by a process of epigenesis. Cole (1930, p. 141) concluded that Harvey's attitude was one of qualified acceptance. Needham (1934) decided that Harvey denied the possibility of generation from mud and excrements by saying that even vermiparous animals produced eggs. Meyer (1936, Chap. V) gives the question careful attention and holds that Harvey did appear to believe that all plants and animals originated from a *primordium oviforme,* or egg-like primary substance, which did not necessarily have the shape or appearance of an egg, that is a hen's egg. But at the same time, Meyer remarks, in other passages Harvey more than once uses language that is consistent with a belief in spontaneous generation.

Adelmann (1942, p. 685) writes: "Thus, while he may have been skeptical, Harvey also appears to accept the principle of spontaneous generation. For an excellent discussion of his attitude in this matter see A. W. Meyer etc."

Meyer's views in the matter have been fully considered and it cannot be denied that they are based on the interpretation of several passages from Harvey's book; but all the same, an attempt can be made to evaluate the force of the positive and negative opinions.

Already in Ex. 1 with reference to the division of animals into vivipara, ovipara, and those arising by spontaneous act of nature, Harvey remarked: "But I dislike this division; because all *Animals* may in some sort be said to be born out of *Egges,* and in some sort out of *Seed*: besides, they are stiled *Oviparous, Viviparous, or Vermiparous,* rather from the *issues themselves bring forth,* then [than?] from the *original matter of which themselves were made*: namely, because they produce an *Egge,* a *Worm or a living creature.* Some of them are also said to be *sponte nascentia,* creatures born of their own accord, not because they quicken out of putrid matter, but because they are begotten by chance, by nature's own accord

etc." Here the meaning is ambiguous, as in several other of his pronouncements on the subject.

Instead in Ex. 38 Harvey wrote that certain insects could fertilize slime; this was already an advance on the "vehemence of the causes" propounded by Fabricius. In Ex. 41 it is said that many animals, especially insects, do germinate and spring from elements and seeds so small as to be invisible, like atoms flying in the air, scattered here and there by the winds; yet these animals are supposed to have arisen spontaneously or from putrefaction, because their seed is not anywhere to be seen. In the same Exercitation mention is made of contagious, epidemic, and pestilential diseases that disperse their infection through the air. Then in Ex. 57 it is remarked: For it is common to all *Animals* to desume their *Original* from *Seed,* or an *Egge*: whether that *Seed* proceed from other *Animals* of the same *species* or happen there casually from something else.

Several other passages could be quoted, without making the meaning clearer, because it is quite evident that though Harvey must have known that his views about ovism and epigenesis could not be upheld together with a belief of generation from dirt and mud, yet he did not make any actual observations and certainly recorded no experimental tests to support his doubts about equivocal generation. It may be that such were mentioned in the script whose destruction he lamented with so much feeling. Harvey denied the transformation of the Cirripedium *Lepas anatifera* into the goose *Anser bernicula* after personal observation in Scotland. John Gerard (1545–1612) wrote in his *Historie of Plants* (London, 1597, p. 1392): "howbeit that which I haue seene with mine eies, and handled with mine handes, I dare confidently avouch, and boldly put down as veritie," *viz.* that the downy birds were hanging by their beaks to the mussels. A readable and interesting book on the subject is by Edward Heron-Allen: *Barnacles in Nature & Myth* (London, 1928). In this Harvey is fully and correctly quoted.

## VII. Harvey's Incentive for Subsequent Biological Experimentation

If Harvey's doubts and uncertain opinions in relation to spontaneous generation have received particular notice it is because his example and methods inspired a series of tests which culminated in the microbiology of Pasteur, Lister, Koch, and many others besides. The ultimate result is evident in the triumphs of modern medicine — a safer motherhood and

childhood, bolder, beneficent surgery, and the possibility of recognizing and combating epidemics and epizootics at the very start.

The problems relative to spontaneous generation could be solved only by means of experiment; no other method would serve. It must be reckoned to Harvey's credit that, undeterred by difficulties and the abstruseness of the subject, he provided the first impulse to further investigations. Originally, Paracelsus described the production of the "homunculus," but this assertion was so obviously fantastic and mendacious that it need only be mentioned. Then Jean Baptiste van Helmont (1577–1644) in *Ortus medicinae* (Chap. IX: *Imago fermenti impraegnat massam semine*) recorded that he had seen mice generated among rags and wheat, though he was astonished in noticing that they appeared as adult individuals. To the modern mind the deception is quite evident. The first real experimental approach to a solution of the problem was made by Francesco Redi (1625–1698), a clever physician, fine poet, and accomplished courtier. In *Esperienze intorno alla generazione del'insetti* (Firenze, 1668), Redi wrote (p. 11): "That greatest philsopoher of our time, William Harvey, held firmly to the belief that all living things originated from seed, as from an egg." [My translation.] This is how Redi set about confirming Harvey's opinion: Pieces of meat, fish, and snake in closed jars were allowed to rot; no maggots developed. Since it might be objected that the lack of air hindered generation, Redi put meat in jars, covered the opening with gauze, and placed these jars in a gauze cage. He then noted that, though the meat was putrefied and fly-eggs were deposited on the outside of the gauze, still no maggots came to life. At the same time maggots were plentiful in exposed rotting meat. Those who have performed similar experiments will have noted how careful Redi was to place his gauze covered jars in a flyproof cage, to prevent the flies dropping their eggs through the openings in the gauze mesh. Anyhow, Redi decided that the test was definite in relation to carnivorous flies, but that the conclusion could not be applied to gall-flies, which he thought were produced by the plant. His evidence was that if the twig containing the gall-worm was broken off, the animal died; he appears to have overlooked the possibility of the grub's drying up and lacking nourishment.

In Ex. 27, Harvey mentioned gall-nuts, rose-galls, and other parasitic vegetable reactions, asserting that the living principle of the animal could not be in the oak. Though the language lacks precision, it seems to mean that the formative "entelechy" of an animal could not occur in a plant.

Unfortunately, instead of following this correct reasoning, Harvey soon wandered off to discuss the rudiments of the yolk in the ovarian cluster of the hen! he was obviously thinking in writing.

The next relevant observer is Jan Swammerdam (1637–1680) who though he did not perform any experiments, by his careful and exact anatomical drawings of the various stages of development of insects made lasting and valuable contributions to knowledge. He necessarily came to the conclusion that creatures of such wonderful complexity and design could not have originated from mud or dirt.

Swammerdam decided for "preformation" partly because of his observations of the metamorphosis of insects; this view he confirmed by his reading of Hebrews VII, 9–10, since he was deeply religious. According to the reliable quotation of Cole (1930) p. 41, Swammerdam's first publication was dated 1669, but I have had to obtain my references from the *Bijbel der Nature* (Leyden, 1737); here on p. 8 the "unparalleled Harvey," on p. 23 the "second Democritus" are mentioned, but on p. 27 it is said: "Dus verre *Harveus* maar soo veel worrden, so veel onwaarheden bijkan." This is the often-quoted criticism that Harvey's writings contained as many untruths as words. What annoyed Swammerdam was that the "immortal Harvey" called a chrysalis a perfect egg (in Ex. II).

Next Antonio Vallisnieri (1661–1730) deserves particular attention, because he made important contributions to the knowledge of generation. He examined the ovaries of ewes, noted the correlation between the number of *corpora lutea* and fœtuses. He investigated the development of many insects, including rose saw-flies, so accurately that a present day diagnosis of their species can be made. This particular work has been translated by Mab and R. P. Bigelow ("Observations on the Fly of Rosebushes and Other Insects of the Same Habitat, by Antonio Vallisnieri," *Isis,* 1932, XVII, 290–324). Vallisnieri, a pupil of Malpighi, wrote:

> Now I do not deny Harvey to be a distinguished man, and that I have a special veneration for him and that he deserves well of the Republic of Letters: but even he was napping at times, and all his writings are not to be considered equally trustworthy. He flourished in that part of the century that was not sufficiently enlightened, and was still encrusted with Aristotelean pitch and heavy with rust. (Bigelow translation, pp. 319-320.)

Vallisnieri attacked the view that mud could produce insects with the cogent argument that if that were the case, dogs, bears, lions, and elephants, even men themselves, could equally well be generated like insects,

mice, frogs, and birds, for they were all equally admirably internally constructed.

There is more than an echo of Harvey in the subtitle of one of Vallisnieri's *Dialoghi* (Venice, 1700):

Della curiosa origine degli sviluppi e dei costumi ammirabili di molti insetti. Dialoghi ne' quali si fa vedere con nuove sperienze ed osservazioni la nascita di ognuno dall'uovo; e la Sapienza e Provvidenza di Dio anche ne' piu minuti viventi.

Vallisnieri accepted preformation and held that all generations of mankind had been present in Eve, but only appeared during embryogenesis.

The accurate observations and fine illustrations of Swammerdam and Vallisnieri had to be admitted, so that the problem of spontaneous generation was switched from the macroscopic to the microscopic world—discovered by Antony van Leeuwenhoek (1632–1723) in his unrivalled lifelong studies. In 1718 Louis Joblot (1645–1723) observed hay-infusions. After they had been boiled fifteen minutes, he separated them in two vessels, one closed with parchment, the other left open. No "animalcula" appeared in the closed vessel, but they swarmed in the open one. Present day knowledge of sterilization permits the suggestion that even in the parchment covered vessel, if not infusoria, sporing bacteria would have appeared a little later.

The next noteworthy experimental observations were those of the Jesuit, John Turberville Needham (1713–1781), who kept vegetable infusions and mutton broth, hot from the fire, in corked vials and after a few days found the contents swarming with microscopical germs, perfectly formed and active ("A Summary of Some Late Observations upon the Generation Composition and Decomposition of Animal and Vegetable Substances," *Phil. Trans.* 1749, No. 490, p. 615. He collaborated with Georges Louis Le Clerc Buffon (1707–1788) who appropriated some of the Jesuit's results, while Voltaire referred to "un fou nommé Needham."

Nevertheless, these rudimentary investigations provided the incentive for a far better and really conclusive series of tests by Lazzaro Spallanzani (1729–1799) who proved that the motile bodies seen by Needham were independent micro-organisms (*Saggio di osservazioni microscopiche relative al sistema della generazione dei Signori Needham e Buffon,* Modena, 1766). Then Spallanzani answered Needham's several objections by a series of brilliant experimental investigations which clinched all argument (*Osservazioni e sperienze intorno agli animalucci delle infusioni,* Modena, 1776). In these he prepared infusions with eleven varieties of seeds,

boiled them for half an hour in loosely corked vessels; after eight days microscopical examination revealed "animalicules" of different varieties. Thereupon infusions were placed in five series of flasks; one batch was left open, the others were sealed with a blow-pipe and raised to boiling point during half a minute to two minutes. All were examined after two days; the open flasks were swarming with microbes, whilst the others contained only extremely minute forms. Spallanzani rightly assumed that the boiling time had not been sufficiently prolonged to kill all germs; so he increased the time to half or three-quarters of an hour and noted thereupon that no life was noticeable in the sealed flasks. The result of these truly remarkable tests caused a lively interest in scientific circles and was discussed with great animation; but it was objected that the air having been heated, it was unfit for the purpose of generation.

Though the nature of a living germ connected with fermentation had been visualized by Adamo Fabbroni in *Dell'arte di fare il vino* (1787) the first clear description of the vegetable cells was given by the physicist Charles Cagniard-Latour (1777–1859) in 1836, who saw budding of yeast in beer and wines. Theodor Schwann (1810–1882) in 1837 described fungi connected with fermentation and the same year Friedrich Traugott Kuntzing (1807–1893) also published the description and illustration of the yeast cell in scum on the surface of vinegar. All these accounts concurred in considering them living vegetable cells. Schwann modified in various ways his tests on the connection between air and fermentation or putrefaction and concluded that heat could render air sterile, but still suitable to maintain life. By bubbling air through cold sulphuric acid, Franz Schultze (1815–1873) showed that floating germs could be killed; in 1843 Hermann von Helmholtz (1821–1894) confirmed that no form of fermentation was possible without germs. In 1850 Theodor von Dusch (1824–1890) with H. G. F. Schröder (1810–1885) rendered air free from bacteria by passing it through cotton wool and bent tubing. It should be recalled that all these experiments were required to explain the erratic results obtained at times, as any bacteriologist knows.

By the middle of the 19th century the experiments of Redi had been confirmed and greatly extended in their application; indeed they had been surpassed by those of Spallanzani. The era of bacteriology was dawning, that is in relation to the pathological significance of certain bacteria. It was Agostino Bassi (1773–1857) who in 1836 by his demon-

stration of the parasitic nature of the muscardine disease of silk-worms may be regarded as the founder of the doctrine of pathogenic microbes (Bulloch, 1938, p. 351). John Snow (1813–1858) stated in 1849 that cholera was water-borne and proved it in practice in 1854 in the case of the Broad Street outbreak. Then Louis Pasteur (1822–1895) succeeded in bringing order into the microbial chaos when, by a series of masterly investigations, he isolated the ferment causing the clotting of milk (*Mémoire sur la fermentation appelée lactique,* 1857). Justus von Liebig (1803–1872) refused to believe that yeast was alive or connected with fermentation, which, he stated was due to physical disturbances of equilibrium. Pasteur recorded his views in *Mémoire sur les corpuscles organisés qui existent dans l'atmosphère* (*Ann. Sciences Nat.* 1861, XVI, 5–98). Henceforth it is scarcely possible to do justice to pathological, agricultural, technical, or general bacteriology without mentioning dozens of names. One may perhaps single out the investigations of John Tyndall (1820–1893) recorded in *Essays on the Floating Matter in the Air, in Relation to Putrefaction and Infection* (1881) as completing from the standpoint of a physicist the practical applications of the surgeon Joseph Lister (1827–1912).

It would be absurd to assert that if Harvey had not written *De generatione* (1651) medicine and biology could not have reached the present stage of progressive knowledge. It is reasonable to suggest, however, that the incentive provided by Harvey resulted in the first experimnts by Redi, then those of John Turberville Needham, Spallanzani, and in this manner indicated the path to be followed. It can be recalled that in Ex. 57 Harvey told how he scratched his hand with clean and dirty needles and noted the resulting inflammatory reaction. This description is one of the first records of the experimental approach to pathology.

References in this chapter are to be found in William Bulloch's *History of Bacteriology* (Oxford University Press, 1938) and William W. Ford's *Bacteriology* (New York, 1939).

## VIII. Harvey's Pathfinding Experimental Study of Mammalian Embryogeny

If one excepts the legendary observations on female slaves made by Queen Cleopatra — as related in the Talmud — Harvey, by tests on deer in Windsor Park and at Hampton Court was the first in the field to observe and record the development of mammalian embryos. He was singu-

larly unfortunate in the choice of subject, because among *Cervidae* there is a considerable lag between fertilization and the naked-eye appearance of the concept. (This was not ascertained till the middle of the 19th century, after prolonged studies by Bischoff, 1854, on the roe — *Cervus capreolus.*) It is greatly to the credit of Meyer (1936) that he clarified the reasons which induced Harvey to formulate the conclusion that generation was due to an influence like that of the stars or a magnet, that is without direct material contact. This was an astrological conception, therefore inaccurate; it warped the opinion of critics, the majority of whom had nothing better to offer. In modern times, the erroneous conclusion has attracted much more attention than the wholly original and pioneer method by which it was obtained; even though it was on the basis of experimental tests, together with microscopical observation, that the present-day approximate measure of certainty has been reached.

For the purpose of getting a clear conception of the painstaking investigations of Harvey extensive quotation is required. Otherwise it is well-nigh unavoidable to introduce terms and meanings corresponding to modern knowledge of the subject, thus permitting wrong inferences. The Latin text has been consulted and compared with the so-called "Lluellyn" translation, which has the merit of being contemporary with Harvey.

It can be assumed that Harvey examined three species of deer which were in the Royal Parks at the time: Red deer, *Cervus elaphus;* Roe deer, *Cervus capreolus;* Fallow deer, *Cervus dama.* Meyer (1936, p 111) doubts whether Harvey examined females of all three species for they would not all behave exactly alike. Harvey did mention slight differences, but in view of his peculiar intellectual perversity (examples will be quoted) which did not allow him to see what he was not looking for, it is quite possible that all three species were observed.

### *Observations and Tests on* Cervidae

In Ex. 64 Harvey explained the main line of his investigations, but some of his good intentions were not to be fulfilled, since he expected to obtain definite conclusions in relation to conception in man. Unluckily, certain notable peculiarities in embryogeny occur in deer; indeed differences are detectable between various species of *Cervidae.*

In Ex. 65 he described the uterus of the hind and doe, comparing it with the corresponding organ in woman. He noted that in animals, virgins, and pregnant women, the uterine orifice was so firmly closed

as not to admit the point of a fine probe or needle. He observed the ovaries, known at the time as "female testicles"; he noticed that in the rutting season, in the hart and buck, the testicles were greatly altered and congested, but said that the ovaries were nowise changed, whether examined before or after intercourse. Harvey decided that the "female testes" could not be of the slightest use in the business of generation. This was a bad slip.

Harvey mentioned the large quantity of seminal fluid found in the vesicles of moles and what may have been the meadow mouse — *Arvicola agrestis* — when in season; notwithstanding this, so he said, the female testes did not alter.

In Ex. 66 Harvey noted that the hind and doe admit the male at one and only one season of the year, in the middle of September, after the Feast of the Holy Cross, and brought forth after about the Feast of St. John the Baptist, 24th June. This corresponded to nine months of gravidity, not eight, as Pliny said, Lib. VIII, cap. 32. Harvey observed closely the mating of the deer and in Ex. VI mentioned his treatise, *De animalium amore, libidine et coitu,* which, if it ever was completed, has not reached us.

In Ex. 67 it was recorded that in September the uterine organs of the doe grew more fleshy, thick, and tender; the inner surface produced papillae or carunculae, which resembled proud flesh or granulation tissue. From the 26 to the 28 September and during October the uterus thickened and these papillae began to resemble breast-nipples. Their internal structure was made up of innumerable points or ducts which on pressure oozed blood.

Since during the whole of September and October (Ex. 68) nothing else was discerned in the uterine cavity, Harvey decided that no semen could reach the site of conception; repeated dissections over the years had failed to reveal any blood or semen in the uterine cavity. Towards the end of October and the beginning of November, when the rutting season had been ended and the females separated themselves from the males, the uterus began to shrink and the inner coating to bulge out, whilst certain globular masses projecting internally nearly filled the whole cavity, so that the sides agglutinated, becoming filled with a pulpy substance like that of the brain. No more blood could be pressed from the caruncles. Harvey then mentioned having noticed a creeping, wavy motion in the "uterus," similar to that seen in the intestines of dogs and rabbits;

this in modern language would be known as peristaltic contraction. He then mused whether the uterus of hysterical females by ascending, descending, and twisting performed similar movements. (The notion that the uterus could move about, like an animal, was an old medical fallacy.) Reverting to the conditions of the doe's uterus, henceforth the tubercular elevations began to shrink, becoming less plump; at times, though rarely, some purulent matter adhered to them. At first Harvey suspected that this might be semen, but decided it was not, because it was so rarely noticeable. Its appearance and consistency differed from that of sperma. Moreover, twenty days had passed since the does had any intercourse with the buck; it should be remembered, however, that Harvey was describing something occurring in November.

So far there was no proof of semen in the uterine cavity and also no evidence of conception. He recorded that he was able by visual evidence, to persuade the King that this was so and also the keepers and huntsmen, but not the physicians.

To settle this important question, the King ordered twelve does to be separated from the bucks towards the beginning of October and secluded in the course at Hampton Court. Harvey then dissected several before the rutting season was over and ascertained that no semen remained in the uterus, although other does were later found pregnant. Harvey added that they had been impregnated by some kind of contagion. This would not have been at all far fetched, if he had admitted the possibility of the "contagion" occurring through some invisible corpuscular element — in the manner he had suggested in Ex. 41 in relation to the alleged spontaneous generation of insects; or even if he had accepted Fracastoro's doctrine of animated contagia.

Even in the dog, rabbit, and other animals Harvey could not find any visible proof of conception in the uterus during "several" days after sexual intercourse. Here he doubted whether the so-called "feminine semen" (now known to correspond to a spasmodic secretion from the vulvovaginal glands) was in any way necessary to fecundation — which it is not. Therefore, Harvey concluded, both the Aristotelian and Galenical hypotheses were wrong; he certainly deserves credit for putting the matter to the test.

In Ex. 6 Harvey stated that he could avouch after many years experience, that the first signs of conception occurred between 12 and 14 No-

vember, though in 1633 the embryos commenced a little earlier, because the weather was cloudy and wet.

In does which had rutted six or seven days before the hinds something was noticeable about 8 and 9 November. These early signs consisted of mucous filaments, like spider's webs, drawn from the superior angles of the cornua. These filaments soon joined to form a membranous and gelatinous tunic or empty sac, which Harvey compared to the *Plexus Choroides* of the brain. Within a day or two this sac filled with clear albuminous matter and appeared as a long shaped pudding. Externally it adhered by means of glutinous matter to the uterine walls; internally it was smooth and contained a viscid fluid resembling egg-albumen. This was the conception in its first stage having the nature and state of an egg. (NB: An important observation, for it can be assumed that it was on this that Harvey construed the dictum, *ex ovo omnia*. Harvey then concluded that the hind and doe, as the result of contagion, produced primordia of the nature of an egg, or like the seed of plants or fruit of trees.)

Although these animals for a month or more had exhibited nothing in the uterus, the conception was perfected between 18 and 21 November, being situated in one or both cornua. The "ovum" at this stage was full of colliquate matter; the fluid was transparent crystalline of far greater purity than that in which the embryo was soon to be floating, and contained within a very thin tunic; in the middle were vascular ramifications and the *punctum saliens*. According to Harvey this was the first genital part which contains the vegetative and motive "anima"; from this all other parts of the fœtus each in order are generated, fashioned, disposed, and endowed with life, almost in the same manner as described in the production of the chick by the albumen of the egg. Both the humours mentioned were present in the conception of all viviparous animals. (This duality of the amniotic fluid was a mistaken notion.) Harvey then discussed and criticized the prevailing opinion that the amniotic fluid consisted of sweat and urine: at the start it could not be the sweat of the very small embryo it contained; its quantity increased with the size of the embryo; it was a pure, clear liquid. Today it is commonly accepted that the amniotic fluid is composed of a transudate of the amnion membrane together with a secretion of the kidneys, which cannot strictly speaking, be considered identical with urine; it contains hormones. Harvey also denied the existence of an allantois in the conception of a ewe.

In Ex. 70 the embryo at the beginning of December — presumably of

the doe — was the length of a finger, with the heart and other viscera within the body cavity. In the anatomized embryo every part was seen distinct and perfect and the lungs appeared congested, for when they had breathed they assumed a paler tint. A turbid fluid, somewhat like white posset or colostrum, could be found in the stomach. In the doe, carunculae of the uterus performed the office of placenta. By the end of December the fœtus was a span in length = 9 inches. It was noticed that the heart pulsated and that the auricles would continue contracting for some time after the ventricles had ceased.

The extremities of the umbilical veins terminated in the caruncles. This was an important observation, because it recognized the independence of the maternal and fœtal circulations, and consequently the fact that the child was nourished through the mother's blood by means of a milk obtained from the placenta. This had already been noted by Leonardo da Vinci (d. 1519) in his *Quadrerni,* but these were unknown at the time. Giulio Cesare Aranzio (1530–1589) in *De humano foetu* (1564) had recognized that the mother's blood vessels did not communicate with those of the fœtus; still he was unaware that the blood was pumped by the heart in a continuous circle.

Harvey was obsessed by the resemblance between albumen and the milky fluid which he could press from the carunculae or cotyledons. He thought that in viviparous animals the unborn child in the womb was not nourished otherwise than the chick in the egg-shell. Harvey was wrong in believing that the fœtus suckled in the uterus: his proof of this was that soon after birth the child took the breast.

According to Needham (1934) p. 124: "The least satisfactory parts of Harvey's book are the Exercitationes LXXI and LXXII on the innate heat and the primigenial moisture. Here he becomes very wordy and highly speculative. . . . It was ironical that the very man who let the light in on cardiac physiology should in his turn despair of the future of our knowledge of embryonic development." It may perhaps be suggested that Harvey was quite competent to describe embryonal development by epigenesis, but felt unequal to giving a reasonable explanation of the actual process of generation.

### *Comparative Embryogenesis*

Throughout *De generatione* Harvey mentioned several observations on the fœtuses seen in different animals, the dog, cat, ewes, and mice, but everywhere his observations were dimmed by his desire to provide addi-

tional evidence for what he had observed in incubated eggs and correlate the features between mammals and birds. Once more his methods were excellent, his application correct, but his conclusions somewhat faulty.

### *Clinical or Bedside Observations*

In the chapters entitled "Of the birth," "Of the membranes and humors of the uterus," "Of the uterine cake," "Of the conception," Harvey dealt mainly with instances or cases he had met in his practice. Though to the modern clinical eye they may appear trite and commonplace, they do show some advance on the views presented in Jacob Rueff's *De conceptu et generatione hominis* (Frankfurt am Main, 1580) which can be assumed to have been the guide of physicians like Harvey. Herbert Ritchie Spencer in *The History of British Midwifery from 1650 to 1700* (London, 1927) praised the chapter "De partu" by Harvey as the first original work on midwifery published by an English author.

## IX. Judicious Results Recorded in *De generatione animalium*

There is no need to stress the contribution made by Fabricius to the knowledge of avian embryology since this has been done with great skill and commensurate knowledge by Adelmann (1942). In the descriptive field Harvey should have been able to complete the observations of his teacher, having his text and illustrations to work upon. Whether he did do so can be ascertained.

Harvey began *De generatione* by acknowledging his indebtedness to Fabricius whose posthumous volume, *De formatione ovi et pulli* (Padua, 1621), served Harvey as a guide; indeed no less than 62 of the 72 exercises refer to chick embryogeny. It is a pity that being carried away by his interest in hatching eggs, Harvey did not obtain a clear conception of the ovulation process nor of the homologous function of the single left ovary of the fowl, when compared with the paired ovaries in mammals.

Harvey started by remarking in Ex. 2 that the chick originated from the germinal spot, which Fabricius had called a *cicatricula,* since he believed that it represented the scar or *cicatrix* left where the yolk detached from the ovary. Harvey in Ex. 61 denied that it was a scar. This was an essential observation, even if it confirmed the opinion of Aristotle.

In Ex. 5 Harvey noted that the strange vestigial organ in the cloaca of

chickens and fowls, the *Bursa fabricii,* was not a receptacle for the semen of the cock, for it occurred in both sexes. Moreover the foramen was so small as hardly to admit a bristle. The Paduan professor taught that this minute sinus contained sufficient cock's semen to explain the fertility of hens during a whole year. By actual experiment, Harvey found that fertile eggs were laid no longer than twenty days after separation from the cock. This was confirmed by Spallanzani (1784). Recent work of Curtis and Lambert (*Poultry Science* VIII, 1929, 142) ascertained the mean duration of fertility to be in the neighborhood of 11 days, with 21 days as the extreme limit. Crewe has, however, secured a fertile egg 32 days after removal of the cock-bird (*Proc. Roy. Soc. Edinburgh* XLVI, 1926, 230).

Aldrovandi thought that the *chalazae* were the cock's sperm; Fabricius believed that the chick originated from one of these paired, twisted ligaments and set about proving it with many arguments. Parisanus disagreed with these interpretations and so did Coiter, but as Harvey somewhat splenetically remarked, Coiter's tale of the three globules was a fable and Parisanus obviously raved when he spoke of certain circles in which a white spot was the cock's semen — Ex. 14. In Ex. 12 and 14 Harvey stated that the *chalazae* were two mutually opposed supports, by means of which the vitellus was retained in the centre of the egg. In Ex. 32 he repeated that the *chalazae* were found in every egg, whether fertile or barren; further remarks were in Ex. 44, with the cogent observation that the *chalazae* were visible unaltered during the first stages of embryogeny in the egg.

These observations do show that Harvey was a better observer in this matter than his predecessors, for he refused to find semen when its presence could be detected only by refined microscopy, as we have ascertained in time.

Sir Thomas Browne (1605–1682) wrote in the third edition of *Pseudodoxia epidemica* etc. (London, 1658, Book III, p. 151):

> . . . how the Grando, or tredle, are but the poles and establishing particles of the tender membrane, firmly conserving the floating parts in their proper places, with many other observables, that ocular Philosopher and singular discloser of truth, Dr. *Harvey* hath discovered in that excellent discourse of Generation; so strongly erected upon the two great pillars of truth, Experience and solid Reason.

It may seem that Harvey was making a great deal of fuss about a matter of secondary importance, but a moment's thought will convince that it was not possible to proceed with an investigation on incubated eggs if the

two moot points connected with the *cicatricula* and the *chalazae* were not settled.

Fabricius discussed at length whether an egg was laid hard or whether it was laid soft and hardened on exposure to the air. In this matter he might have sided with Aristotle and decided soft.

In the alternative he might have abided by the information received from housewives who examined hens when they were on the point of lay, and have rightly concluded, hard. After prolonged discussion Fabricius conceded that it was laid *inter molle et durum,* that is, "with a consistency between soft and hard, solidifies considerably and at once during its emergence, because, as Aristotle says, a certain viscid, sticky fluid which moistens the entire surface of the egg when laid immediately condenses on the shell because of the evaporation of the moisture" (Adelmann translation, p. 158).

In Ex. 11 Harvey said that he had long been shackled by Aristotle in thinking that the egg was laid soft and hardened in the air, but that now he was convinced of the fact that the egg, even when contained in the uterus of the hen, was covered by a hard shell. Incidentally, the modern reader of Aristotle may find that the corresponding passage has been somewhat mistranslated; what the Stagirite can have meant is that the egg is covered with slime, serving as a lubricant, and that it is this slime which dries on exposure to the air.

There is much more in Harvey's *Exercitationes* on the same subject. Though it would be unfair to compare Fabricius and his pupil on this single point, it seems that the conclusions reached do indicate somewhat different mentalities.

From the standpoint of avian pathology it can be said that, as a general rule, a soft egg is accompanied by more trouble in laying than a hard or normal egg. This may be connected with disturbances in the function of the oviduct, but often enough soft-shelled eggs are found retained in the oviduct and some even burst through the walls of the egg-tube.

Fabricius believed that there was continuity between the blood-vessels of the uterus and those of the fœtus through the "fleshy appendages" (*chorionic villi*), but Harvey decided that the two were separate. Adelmann (1942, p. 103) considers this was more "fortunate than perspicuous." Even so Harvey obtained his conclusion by noting that there were separate circulations of the blood in mother and child. Fabricius held that the mother supplied both the heart and the arteries of the fœtus.

Harvey in *De membranis* stated quite clearly that in a cæsarean section he had seen that the fœtus was extracted alive, whilst the mother was dead. The same thing he had observed in obtaining live rabbits and hares from the dead animals; then in a tedious labour he had noticed that the rhythm of the pulse at the wrist of the mother and that of the umbilical cord differed. Here Harvey was at his best.

Fabricius had taught that the process of embryonic development was essentially one of transformation or metamorphosis, by which it can be understood that he meant that formless matter became simple features and that these were gradually altered so as to advance to more complicated shapes. Harvey admitted this in relation to insects, but from his observations of embryos decided for the Aristotelian doctrine of epigenesis or a gradual building up of parts. This may seem a quibble about words in the guise of discussing facts and observations, but in reality, in reading Harvey's Ex. 45 it is evident that the conception was much clearer in his mind than what can be gathered from the existing writings of the Stagirite. Charles Otis Whitman (1842–1910) was barely justified in writing in *Evolution and Epigenesis* (Boston, 1896, p. 205), "Harvey's dictum is a vague generalization exceeding in no way what Aristotle had already maintained — in fact it may be regarded only as a fair summary of Aristotle's views and surpasses them only in metaphysical extravagance."

One is sorely tempted to retort with a Johnsonian: "Sir, enough of this; 'tis the language of ignorance." The shackles of Aristotle are clearly noticeable in many pages of Harvey's writings; but the doctrine of epigenesis was construed and confirmed out of numerous and varied observaitons.

Moreover, in Ex. 40 Harvey made it quite clear that he could prove that Aristotle's generation hypothesis of menstrual blood+sperma was erroneous, for he had examined both the oviduct of fowls and the wombs of animals and had been unable to detect either free blood or sperma in them. This can be said to have been more superficially correct than essentially accurate; but the opinion was based on actual observations.

## X. Some Faulty Anatomy, A Clinical Blunder, and Several Blamable Conclusions

Though up to now quotations from Harvey's writings have shown him to be right where his contemporaries were wrong, it is but fair to

mention where he was guilty of several superficial or inaccurate observations in his third book.

In Ex. 5 Harvey stated that cassowary (*Casuarius galeatus?*) from Java had no tongue; but it is doubtful whether he was repeating something that was told him or whether he meant that being devoid of taste, the birds devoured anything that was given. Next, in Ex. 40 he accepted the story of the pregnant fœtal mice from Persia in Aristotle's *Hist. Animalium* IV, 37. Harvey mentioned that physicians denied this wonderful story, because they held that conception was due to a mixture of male and female semen; an argument that would not persuade Harvey, whilst his "seminal influence" would render it believable. We, in 1947, can say that it is more than highly improbable, because in the fœtal mouse the ovary would not be sufficiently developed to produce an ovum and then because a spermatozoon could not pass the membranes.

Meyer (1936, p. 136) takes Harvey to task because he said that the blood of persons executed by hanging turned into ichorous sanies. A careful reading of the text Ex. 52, shows that Harvey was referring to criminals hanging in chains, who presumably were putrefying, in which case his description would be right. In Ex. 56 Harvey did say that feathers arise from the lowest part of the integument or even the periost; anyone who has dissected the wings of young birds will understand how easily the mistake can arise (Harvey mentioned wing-feathers). These are really minor matters; more important is the statement that birds have no spleen (Ex. 7), which is quite erroneous. He overlooked the glandular stomach in fowls, though he obtained a correct understanding of the function of the gizzard and the stones it usually contains.

In relation to mammalian embryogeny, it is difficult to avoid the conclusion that Harvey did not interpret rightly the differences he noticed between the various animals he examined, but rather attempted to make them fit into a preconceived schema. Thus his observations on the oestrus of the *Cervidae* in Windsor Park are generalized, whilst it seems ascertained that there are certain differences; for example, Marshall says in *Physiology of Reproduction* (London, 1922) on p. 44: "In Scotland the red deer's sexual season lasts three weeks during September and October, according to Cameron, while in this country [England] September is the sexual month for the fallow deer, and July and August the time when the red deer will receive the male. There are again differences between the wild and the captive state."

Here Meyer (1936) can be usefully quoted, who writes on p. 112: "According to Bischoff (1854), whose observations were confirmed by Keibel (1899), the ovum of the European deer, which is fertilized in July and August, descends to the uterus in a few days, but the blastocyst undergoes such slow development that the mesoblast does not appear until after the fourth month." Meyer then decides, quite rightly, that the conceptuses Harvey described must have been older than he thought, a not uncommon error in embryogenic observations. It may well be that Harvey, who also observed sheep, was making an arithmetical mean between different observations.

Harvey then failed to notice the congestion that occurs in the ovary when does come into season nor did he see the Graafian follicle or a *Corpus luteum.* He remarked that the compact substance of the ovary did not seem adapted for the production of feminine semen; he then suggested a correct origin of the fluid ejaculated by the vulvo-vaginal (Bartholin) glands of women.

Harvey insisted that what Fabricius had described as an allantois was nothing but the chorion; Harvey was even unable to accept the presence of this feature in deer or sheep, by writing: "I find nothing of an allantois, of which something has been said as a tunic distinct from the chorion in the conception of the ewe." He may have observed later stages, when the allantois fuses with the chorion, but his study of incubated eggs should have allowed him to recognize the structure.

Harvey's unforgivable mistake was in contradicting Fabricius, who held that the child was born by the combined muscular pressure of the uterus, diaphragm, and abdominal muscles. Harvey said that the arguments of Fabricius were pleasant and elegant, but not well bottomed, because the child was delivered by its own efforts! It seems hardly possible that Harvey could have ever been present at a confinement, waiting during hours for the "pangs" or muscular contractions to expel the baby. By a strange quibble, Harvey referred to the muscular efforts and quivering of the whole body as if they were something quite different from the contractions of the uterus or the action of the diaphragm and abdominal muscles. His reasoning appears to have been on these lines: The unborn viper eats through the egg-shell whilst still in the womb. The ostrich chick breaks through the egg-shell even when incubated in the sand, without the help of the mother, as even Fabricius admitted.

The Queen had a white pony mare which had been infibulated; never-

theless it became pregnant and foaled in the night, though the pudenda were torn on the left side. Harvey added: "Such is the force and vigour of a full grown and healthy fœtus." A woman who in a previous parturition had been badly torn, became again pregnant and prepared for death; though her sufferings were dreadful, a vigorous infant was born and by the exhibition of proper remedies, she recovered her health, thus opening the way for further children. A woman in Harvey's neighbourhood died one evening and next morning an infant was found between the thighs of the mother. This might have been evidence, had the child been alive and things had really happened as asserted; but there must have been a mistake somewhere.

Gregor Nymann (1594–1638) was quoted by Harvey as mentioning other similar instances. Nymann, professor of botany and anatomy at Wittenberg, and author of *De vita foetus in utero* (Wittenberg, 1628), was mainly concerned with proving the independent essential life of the child in the womb, that its soul activated the body. Harvey also mentioned a pregnancy in the prolapsed womb of a washer-woman, that ended in a dead, immature fœtus; here he admitted that the uterus had expelled the miscarriage, but he apparently decided that the circumstances were quite exceptional.

Anyone who has practiced midwifery will notice how Harvey evaded the obvious conclusion from the cases he had observed by saying that abortion and defæcation occurred as the outcome of muscular contraction, but that live birth was the result of the baby's own activity; surely, surely, the child is limp and inert when delivered!

## XI. Supporters and Adverse Critics of the Harveyan Hypothesis

Harvey obtained his theory of conception after numerous observations and tests, however wrongly interpreted; he was well aware how remarkable his views would be. Meyer in "Harvey's Appraisal of His *De generatione*" (*Bull. Hist. Med.* 1942, XI, 72) quotes a hitherto unnoticed passage in Harvey's letter to Riolan, which was published in 1649. In this Harvey stated that he would before long have occasion to put before the world even more wonderful things that would give more light to natural philosophy [than the circulation of the blood]. Meyer reasonably suggests that this, having been written in 1649, might well refer to the

remarkable creation of the ovum by the female organs of generation through the distant contagion of the sperma of the male.

When Harvey formulated his views on the subject (as he did in the last pages of his book), he insisted that since ideas could be transmitted to the brain through the eyes — and according to him the substance of the uterus was very much like that of the brain — it follows that a similar process could occur in both, particularly as the functions of womb and brain are called "conceptions." It is most depressing to follow Harvey through this maze of dialectical quibbling, especially after having noted the wealth of accurate and far-seeing observations that are scattered through *De generatione*. Admittedly, in the same manner that occurred after the publication of *De motu* (1628), Harvey's contemporaries who criticized or ignored the deductions from his observations and tests could not offer anything better to explain the extreme difficulty of the cock's seed reaching the ovary through the many intricate folds of the pullet's oviduct, the absence of any sperma in the uterine cavity, or the non-existence of any visible proof of conception in the uterus of does several weeks after sexual cohabitation.

Nathaniel Highmore (1613–1685) was the author of two books, both of which were published in 1651. The first one, *Corporis humani disquisitio anatomica* (Hague, 1651), was dedicated to Harvey with the date "Sherborne, 4, Dec. 1650" and on p. 106 mentioned those seminal material atoms, which were more diffusedly discussed in his next work, *The History of Generation* (London, 1651). This was dedicated to Robert Boyle, with the date 15 May 1651, and thus must have been published after the appearance of Harvey's book in March the same year.

Highmore made use of alchemical language to explain the production of his "seminal atomes":

> . . . and exactly extracted from the blood, passing through the body of the Testicles; and being in this Athanor cohobated and reposited into a tenaceous matter (lest being spiritual and very fine, they should lose their vigor) at last, passed from the body of the Testicles by certain vessels, in which through infinite meanderings, it undergoes another digestion and pellicanizing.

According to Highmore the "masculine atomes" were produced in the prostate, the feminine in the female testes. A great deal was said that might lead one to believe that he had seen an "ovum" and discerned a spermatozoon, but since there was no trace, hint, or suggestion of shape,

it must be concluded that this was no more than intelligent anticipation. He examined the germinal spot in eggs and concluded as follows:

> *Fabritius* makes mention of a little white Circle or Cicatricula on the thin Membrane of the Yolk; which he supposes to be a skar, left by breaking off from the foot-stalk by which it was fastened to the Hen, before the White grew about it. But if ye further observe it, ye shall find another thing. Parisanus would have it be the seed of the Cock. I think it be the seminal Atomes derived from both, here deposited.

Thereupon followed a description of the development of the chick from this point. Highmore apparently did not recognize the egg as an "ovum" or to correspond to the "feminine material atomes" of mammals. He suggested that even before incubation there was some distinction of parts, which became clearer during development; he thus was inclined to accept preformation. On p. 65 he wrote that the *chalazae* were ligaments to keep the yolk in equilibrium; if they were the source of generation, each egg would produce two chicks. Though Highmore did not perform any experiments to invalidate Harvey's observations and conclusions, on p. 96 "Doctor *Harvies*" was criticized and it was suggested that he had examined the wombs of barren does and hinds, therefore had not found any products of conception during weeks. On p. 100 was mentioned: "The observations of Doct. *Harvies* related to us by Sir *Kenelm Digby*"; this seems to indicate clearly the source of Highmore's information. Moreover, it may explain why Highmore was such a wholehearted supporter of Sir Gilbert Talbot's powder of sympathy for healing wounds at a distance though it does seem illogical to admit the distant action of the powder and to deny that of male sperma. Digby, like Fludd and many others, was a firm believer in the virtues of the "Powder of Sympathy" which cured wounds by being applied to the weapon or in some instances simply by soaking in it a handkerchief or article belonging to the patient. Several instances of these miraculous "cures" were recorded at the time.

Alexander Ross (1591–1654) a Scotsman, chaplain to Charles I, wrote *Arcana microcosmi* (London, 1652) with additional remarks by Dr. I. Pr. whom I suspect of having been Iacobus Primerosius, a singularly bonehead, old-time opponent and critic of the Harveyan circulation. In these observations the same feeble quibbling about generation theories is noticeable, which was apparent in Primerose's criticisms of *De motu* (1628).

The "preformation" hypothesis was soon supported by Henry Power (1625–1668) whose *Experimental Philosophy* (London, 1664) recorded

microscopical examination of the *cicatricula* in incubated eggs. Then Jan Swammerdam (1637–1680) also became a "performist" as the results of studies on insects published in 1669. Cole (1930, p. 45) reports that William Croone (1633–1684) in March 1671 deposited with the Royal Society, a manuscript on the development of the chick; the complete paper in Latin appeared in 1757. Croone, after referring to Harvey with great respect, attempted to establish by observation and illustration the corporeal existence of a preformed fœtus in unincubated eggs. Cole decides that what Croone saw was a fragment of the vitelline membrane imitating the beak and head, on the basis of which Croone evolved the hypothesis of "instantaneous generation." Marcello Malpighi (1628–1694) in the Royal Society memoir, *Dissertatio epistolica de formatione pulli in ovo* (London, 1673), discerned the embryo in an egg he thought was not incubated — but he must have been mistaken. Having made a false start, he accepted preformation, though subsequent correct observations must have shaken his belief. Here we have a clear-minded and sound student flying in the face of obvious — or seemingly obvious — evidence. Niels Stensen (1638–1686) in his *Elementorum miologiae specimen* etc. (Florence, 1667) described the organs of dog-fishes and concluded that the ovary (*testes feminae*) was like the roe of fishes. Then René de Graaf (1641–1673) in *De mulierum organis generationi inservientibus* etc. (Leyden, 1672) recognized that the ovary in birds was directly comparable to that in mammals and gave a first account of the process of ovulation in mammals though the "Graafian follicle" was not the "ovum" but contained it. Then in a letter dated Nov. 1677, but published in 1679, Antony van Leeuwenhoek (1632–1723) first described the spermatozoa seen in a specimen brought to him in August 1677 by Johan Ham of Arnhem (b. about 1650 — date of death unknown) and confirmed in his own sperma.

But even so, preformationism had obtained such a hold on the mind of investigators, that Needham (1934, p. 185) can number among ovistic preformationists Swammerdam, Malpighi, Bonnet, von Haller, Winslow, Vallisnieri, Ruysch, Spallanzani. On the side of the animalculistic preformationists were Leeuwenhoek, Hartsoeker, Leibnitz, and many others. Time has shown that these arguments could be refuted or confirmed only by skilful microscopy or repeated experiments, because careless examination or single tests might easily provide wrong conclusions. An example can be quoted from *Adenographia curiosa et uteri foeminei, anatome*

*nova* (Leyden, 1691) by Antonius Nuck (1650–1693). Under the marginal heading, *Animal ex ovo generari experimento probatur* on pp. 68–70 there is the description of the ligature of the left horn in a bitch on the third day *post congressum,* when two ova were in the corresponding ovary. The wound was sutured, then reopened on the 21st day, when two fœtuses were seen in the left horn, above the ligature and three in the right, in their usual position. In all purulent matter was noticeable; the operation was obviously not aseptic. Nuck concluded that the two fœtuses were *"aura seminalis fecundati,"* since nothing could have passed the ligature. Modern gynæcological practice has proved that ligature alone will not prevent pregnancy, but that excision of a piece of tube is necessary. What is notable is that Nuck, a Leyden professor of anatomy, could still conclude from an experiment that an *"aura seminalis"* was capable of fertilizing, though his countryman Leeuwenhoek had described the spermatozoon in 1677.

In 1752 Albrecht von Haller (1708–1777) together with one of his students examined 51 ewes at intervals after mating. Beginning with the thirteenth day they observed a stringy mucus in the uterus, which by the third week had condensed in an embryo surrounded by membranes etc. Cole (1930, p. 182) states that von Haller was unable even after careful examination with a lens, to find any trace of a fœtus during the first 17 days after mating. Accordingly, von Haller wrote that the celebrated Harvey was emphatically right in denying that any semen could reach the uterus. Later on von Haller did find male semen in the uterus of ewes, but he denied that the ovarian vesicles of vivipara were eggs — as stated by Graaf — though he found in them the first rudiments of the animal. He thus became converted from epigenesis to admit preformism. These results were published in *Elementa physiologiae corporis humani,* Vol. VII and VIII (Lausanne, 1765–1766). Also in *De quadrupedum utero, conceptu fetu,* in *Opera minora* (Lausanne, 1767), Vol. II, p. 422.

Meanwhile, Caspar Friedrich Wolff (1733–1794) published *Theoria generationis* (Halle, 1759), in which he revived epigenesis and supported it by serried arguments and careful observations on the primitive blood-islands in hatching eggs. His later work, *De formatione intestinorum* (N.C. Acad. Sc. Imp. Petropol. XII, 1768; XIII, 1769), completed the argument by descriptions of the development of the gut in the hatching chick. Though correct and quite sound, these investigations were known to few and did not convince many at the time.

Reference may be made to the writings and illustrations of Jacques Gautier d'Agoty (b. Marseille 1710 — d. 1785), artist and printer, who was interested in natural science. Cole (1930, p. 105) reproduces one of the pictures of this enthusiastic investigator, who saw complete fœtuses in the sperma of man, of a horse, a donkey, and a cock, and found embryos in the urinary bladder of a frog. The latter, Cole credibly suggests, were probably parasitic worms of the *Polystomum* genus. Gautier d'Agoty, being a Provençal, was not devoid of Gallic wit, coupled with a well-nourished vein of caustic criticism.

> Harvey, de sa pure grace, donne aussi des oeufs, a toutes les femelles, ne distinguant les animaux ovipares d'avec les vivipares. . . . & pour donner une idée précise de cette mechanique, il dit que la Matrice conçoit le foetus, comme le cerveau conçoit les idées. Sans doute il écrivoit pour des gens qui sçavoient déja comment se forment les idées.
>
> *Oeuvres,* 1752, Tome I, pt. 1, page 11.

In the second volume, Observ. XIX, d'Agoty wrote that Harvey and Malpighi had amplified natural history of an infinity of fables which experience had denied; the harm would not have been great, had they not been believed by many physicians, who had based their investigations on these fairy tales. All this is applicable to the observations of father and son, except that there must have been few, very few, physicians who believed the fertile illusions of the two d'Agoty.

The controversy between "Ovists" and "Animalculists" continued, each party contending that the fœtus was preformed in the egg or the "animalcules." Fanciful details were seen in spermatozoa, whilst ovists asserted that no other standpoint was logically possible, but that the embryo was present in a concentrated form in the ovary. Against the significance of spermatozoa it was said that it was impossible that myriads and millions should be produced to be wasted so that a single one should produce another individual.

Charles Bonnet (1720–1793) explained his support of preformation in *Manière dont on peut concevoir la nutrition et l'accroissement des germes avant la fécondation dans l'hypothèse de l' emboitement* (Jour. de Physique 1774, III, 174–180). A notable supporter of preformation was Lazzaro Spallanzani (1729–1799) who backed his views by numerous observations and tests. It is difficult to do justice to his work, not only because his conclusions are sometimes faulty, but also because he soon adopted

ovarian preformation and was persuaded that epigenesis was wrong; accordingly all his results were coloured by this ingrained opinion.

Since his original publications are not easy to obtain, the French edition has been consulted: *Experiences pour servir à l'histoire de la generation des animaux et des plantes — avec une ébauche* etc. par Jean Senebier (Genève, 1785). Spallanzani's tests were mostly made on frogs, toads, and salamanders. A bitch was inseminated and also cats, for the purpose of obtaining dog-cat hybrids, but the experiment failed. Spallanzani was particularly proud of his artificial insemination of a bitch, which after 62 days whelped two dogs; his experiment was confirmed by Professor Pietro Rossi of Pisa. (It is difficult to understand why it should be expected that by injecting 19 grains of dog sperma through a warmed syringe, the same result should not be obtained as by the natural method.) He started his frog experiments by examining 156 females, to make sure that the eggs on the point of being laid were all sterile. He then proved — against Linnaeus — that these eggs were fertilized outside. (In the tree-frog, *Rana esculenta,* the eggs were fertilized in the uterus.) This enabled him to perform a series of excellent experimental tests. I have gone to the trouble of reading through them and in every case the results are truthfully recorded; for example, a whole testicle thrown into the water will not fertilize eggs; if minced it will. The modern biologist will understand the reason for this. By mixing three grains of sperma in 22 gallons of water, it was still possible to fertilize some eggs placed in the dilution. He proved that the steam or aura was not capable of fertilizing, but only the substance itself (p. 210), and that dried sperma had lost all vital power. He found that the fecundating power of spermatized water was reduced by filtration through cotton-wool or filter-paper and that it was completely lost after passing through several thicknesses of filter-paper. If these papers were squeezed on to amphibian eggs, they proceeded to develop; from all this Spallanzani concluded that the "fecundating virtue" was retained on the paper, but still denied that it resided in the spermatozoa.

Cole (1930, p. 184), says that Spallanzani was a skilful experimenter and acute reasoner, yet decides that these studies show him at his worst. To me they prove that Spallanzani was a truthful recorder of what he saw; if his conclusions were erroneous, all the more reason for being lenient in our appreciation of Harvey's theorizing.

John Haighton (1755–1828), after experiments on rabbits, concluded

that the ovaries can be affected by the stimulus of impregnation, without the contact of semen (*Phil. Tr. Roy. Soc.* 1797, LXXXVII, 159). W. C. Cruikshank (1745–1800) reported on: "Experiments in which on the third day after impregnation, the ova of rabbits were found in the Fallopian tubes; and on the fourth day after impregnation in the uterus itself; with the first appearance of the fœtus," (*Phil. Tr. Roy. Soc.* 1797, LXXXVII, 197). Cruikshank described the *corpora lutea,* but disbelieved the existence of spermatozoa.

William (1717–1783) and John Hunter (1728–1795) made valuable contributions to embryonal anatomy. The former proved by accurate examination that maternal and fœtal circulations were separate, as Harvey had already asserted. John, aided by William Clift (1775–1849), made excellent preparations and drawings of the developing chick in the egg and gave an account of the process of development and recapitulation, both of which had been sketched in a rudimentary manner by Harvey. These drawings and preparations appear to have been appropriated by Sir Everard Home (1756–1832) and published in his *Lectures on Comparative Anatomy* (London, 1823, Vol. III, Lect. XIV "On the changes the egg undergoes during incubation," 423-444). The drawings, by Franz Bauer, are very good. The relative plates are Tab. CLVIII to Tab. CLXIX, Vol. IV, 1828. In the text Home remarked:

> Although this is a subject to which the great Hervey, Malpighi and Hunter applied their whole strength, there was three disadvantages they could not overcome, which Bauer had not to contend with. 1st, They had not previously examined the human molecule, they had therefore not the first point established; 2dly, They had not been inured to microscopical examinations, so as to bring them to perfection; and 3dly, they could not with accuracy delineate what they saw, but were obliged to resign that office to another.

This criticism appears to be somewhat disingenuous, in view of what is known of the source of Home's lectures and illustrations. For example F. H. A. Marshall states in *The Physiology of Reproduction* (London, 1922, p. 393):

> We owe to Harvey the conception of the placenta as an organ elaborating from the maternal blood the aliment necessary for the growth and development of the fœtus. He was the first to reject the "subtleties and fanciful conjectures" on embroyonic development and to advocate and to practice direct and diligent observation. But for a century after his death the placenta received little notice . . . [till] the researches of John and William Hunter on the human placenta.

In 1821 the Royal Society of Sciences of Göttingen offered a prize for the recognition of the origin of the true female egg in mammals — whether it is produced in the "yellow body"; if so, when does the egg go forth; what is the purpose of the cysts of the ovary and what part have they in generation? [My translation.]

In 1824 the prize was awarded to the veterinarian U. F. Hausmann, who published his essay in Hannover, 1840. From this it is learned that he held that the egg was fertilized without actual contact with the sperm but as a result of "Nerven-reiz" (= nerve action). His reason was that which had impressed Fabricius and Harvey — the many folds of the oviduct in a hen would not allow the passage of any particle. Hausmann's essay was well illustrated and contained observations on mares, cows, bitches, and other animals.

It is noteworthy that the same year in which the Göttingen Society awarded the prize, in Geneva, Jean-Louis Prévost (1790–1850) and Jean Baptiste Dumas (1800–1884) published their joint investigations and reported that they had repeated Spallanzani's filtration tests and found that spermatozoa were the essential, vital constituents of semen. They also traced their origin to the testicles. Henceforth progress was rapid. Heinrich Christian Pander (1794–1864), who had in 1817 published his studies of chick development, inspired the work of Carl Ernst von Baer (1792–1876). He established the origin of the principal organs from germ layers and in May 1827 discovered the mammalian ovum in the dog, by working backwards from embryos of 24 days. Publication took place in January 1828. Von Baer did not grasp the full significance of his discovery; Meyer (1936, p. 71) wrote:

> Even von Baer, who discovered the mammalian ovum, had Harveian ideas regarding fertilization, for he thought that semen merely exerted an influence upon the ovum which, being somewhat inert, had first to be endowed with life by the sperm. He, like Harvey, thought that the mere proximity of the semen to the eggs was all that was necessary in fish, though in higher animals its substance might be indispensable.

In 1841 Albert von Koelliker (1817–1905) pubished a complete histological study of spermatogenesis and thus explained the origin of the spermatozoon; his later writings completed the comparative histogenetic knowledge of the subject. In 1876 Oscar Hertwig (1849–1922) demonstrated the actual combination of two gametes, observations confirmed

by Hermann Fol (1845–1895) of Geneva in 1879 and extended by many others.

Anyone following even only the main outlines of the progress made from Harvey's time must feel inclined to admit that where he erred, others better trained, more learned than he was, obtained similar faulty conclusions. Moreover, they must concede that he was the first to trace the right path for subsequent lasting achievements.

In compiling this chapter, in addition to the works already mentioned, help was obtained from the review by George W. Corner: "The Discovery of the Mammalian Ovum," *Lec. Hist. of Med.* (London, 1933), pp. 401–426.

## XII. Some Minor Subjects for Examination

### *Harvey's Religious Opinions*

Meyer (1936, p. 32) discusses whether Harvey was religious and contrasts the opinions of Ogle (1880) who wrote: ". . . like Galen, like Newton, like blind Galileo, like Faraday, he [Harvey] was a firm believer in, and recogniser of, the hand of the Divine Architect in the outer world of nature"; and that of Needham (1929, p. 209) who held that Harvey lacked "deep running veins of religious feeling."

There is really no sharp contrast between these two remarks, because they simply mean that Harvey was a Theist, rather than a professional devotee. It should be remembered that Galen was not a Christian; that though Newton did engage in theological discussions, his views showed considerable philosophical detachment; that Galileo came into conflict with his Church. True, Michael Faraday (1791–1867) was a devout Nonconformist, but his opinions would have been quite unorthodox in Harvey's lifetime. A man with deep-running veins of religious feeling, like George Fox (1624-1691) or John Bunyan (1628–1688) would have revealed his beliefs otherwise than by vague references to the *Digitus Dei.* I have mentioned this matter previously, because of a remark of Lynn Thorndyke (1927, p. 420), and decided that Harvey's religion could be classed according to what Sir Anthony Ashley Cooper (1621–1683) is reputed to have said: "That men of sense are really but of one religion, but never tell it."

### *The Frontispiece of the 1651 Editions*

For brevity's sake Harvey's significant dictum has been quoted: *Ex ovo omnia,* which does not occur in the text, but is taken from the frontispiece illustration of Jove or Zeus allowing various animals to issue from an egg.

It is doubtful whether Harvey chose the picture; it seems more probable that "old Ent"— who was 46 at the time — did so, when meeting the printers. From an annotated London edition of *De generatione* which belonged to Baldwyn Hamey (1600–1676), now in the University Library, Cambridge, it can be learned that the emblem was obtained from the book of Vincenzo Cartari: *Le imagini de i dei degli antichi.* There are several editions and some translations of this work, with differing illustrations; but Harvey's frontispiece approaches the picture in the 1630 Padua edition, where it is said on p. 135:

Il Creatore delle cose . . . perche sta in sua mano dare vita all'vniverso . . . questo significa il circolo che tiene in mano. Manda poi fuori della bocca vn vovo . . . significa il Mondo, & Volcano quel calor naturale che in esso da vita alle cose.

Here Charles Singer can be quoted in *A Short History of Biology* (Oxford, 1931, p. 459):

*Ex ovo omnia* . . . The phrase is prophetic for Harvey had not seen the minute ova of viviparous creatures, such as mammals. Harvey does not, in fact, attach the exact meaning to the word *ovum* it now has. His discourse has however this of genius, that its content is greater than the utterer knew.

### *Did Harvey write* De generatione *in Latin or English?*

The doubt appears to have arisen whether Sir George Ent translated Harvey's manuscript from English into Latin or whether the original Latin was translated into English for the edition of 1653. The problem is well-nigh insoluble. More important would be to know whether the book really does reveal Harvey's thoughts on the subjects considered; for Harvey could have well allowed his many observations and tests to speak for themselves, instead of supporting his interpretation of phenomena seen by endless hair-splitting discussion.

Keynes (1928) states that there is no evidence connecting Lluelyn with the translation of *De generatione* into English. True, the *Dictionary of National Biography* in the entry under Martin Lluelyn (1616–1682), poet, physician, author, M.D. Oxon, 15 July 1653, does not mention his having translated Harvey's work; but that is not evidence for or against. The volume in the Royal Society of Medicine in London shows that the introductory poem ends with the initials M. LL. M.D. Assuming that the text was originally in Latin, if Lluelyn did translate it, he might not have thought it necessary to be more explicit than by placing his initials where

he did. In the poem full knowledge of the text is apparent and Harvey was called "Fam'd *Circulator* of the *Lesser World*"; the verses end:

> Live Modern Wonder, and be read alone,
> Thy Brains hath Issue, though thy Loins have none.
> Let fraile Succession be the Vulgar care;
> Great Generation's selfe is now thy Heire.

### *Portraits of William Harvey (1578–1657)*

The Historical Section of the Royal Society of Medicine published in 1913 a collection of portraits of Harvey. This has been criticized for inaccuracy and incompleteness—not without justification, for the volume was hurriedly prepared, to be issued in time for the International Medical Congress in London that year. Hence its faults.

In relation to the portrait of Harvey in the Royal College of Physicians, London, it is said: "It is a pleasing picture spoilt by the right hand, which is so painted as to make it seemed deformed." Apparently the ring and little fingers are bent in a so-called "Dupuytren's contracture." It is noticeable in other portraits of Harvey that where the right hand is shown, it is holding a stick or book so as to hide any deformity. It may be that in a portrait intended for his medical colleagues Harvey wished his condition clearly shown.

## XIII. HARVEY'S SIGNIFICANCE IN THE PROGRESS OF BIOLOGICAL KNOWLEDGE

In attempting to assess the actual, real, lasting value of any man in the History of Science — including Medicine — it is easy to confuse several features of success. In the first instance it is essential to distinguish between the personal intellectual eminence of the man and his permanent achievements. One must then ascertain whether his example or teaching or simply his recorded work has been conducive to progress in knowledge, either by inspiring the practice of methods by means of which such progress can be obtained or by clearing previous errors and adding to the general intellectual patrimony. It can then be seen whether the reaction of his contemporaries — be it favourable or otherwise — can be accepted as correct in the light of subsequent advances, for in the course of time many values may stand out more clearly, instead of blurring or fading. Moreover, there should be some correlation between doctrine and actual practice; for example, Francis Bacon (1561–1626) who wrote so en-

gagingly on the difference between "experiments of fruit" and "experiments of light" was incapable of planning or performing a single test. Even with all his judicial wisdom he could not recognize the value of the investigations made by his contemporaries.

It can be explained that Bacon distinguished between "natural" and "superstitious" magic. An example of the first would be the "magic" practiced by Giambattista Porta (1536–1615); to the second Bacon would have reckoned Dr. John Dee (d. 1608). Apart from these, it is known that Bacon had a mean opinion of the results of the truly remarkable experiments of William Gilbert (d. 1603) and of William Harvey and despised, perhaps with some justification, the farsighted assertions of Robert Fludd (d. 1637) — an example of the evils of theory without practice.

A great man, one of the greatest, would be Leonardo da Vinci (d. 1519). An admirable artist, a first class technician, a sound scientist, he hid his anatomical drawing and manifold original thoughts in his *Quaderni,* only some of which have survived. They were unknown to Giorgio Vasari (d. 1574) and a few were first discovered by William Hunter at Windsor Castle in 1784. Had Leonardo completed and published his great *Codice Atlantico* he would have influenced scientific progress to a considerable extent; his was the light under a bushel.

Bearing all this in mind, it can be said that though Harvey was not a very learned or very capable person, still he succeeded in achieving great things and provided a dynamic impulse to subsequent progress, for he not only wrought, he also taught, and then published.

Though several text-books on embryology mention Harvey, their praise is mainly based on his having clearly stated that all animals originated from an egg, a statement that requires qualification.

Meyer (1936) obviously has a good knowledge of the subject, yet wrote on p. 138: "Harvey did not discover observation and experiment, nor was he the originator of the scientific method." Of course Harvey was not the sole originator of the modern scientific method of research which consists mainly in observing on a small scale, under controlled conditions, certain definite phenomena and from these observations deducting conclusions and laws that are applicable to a much wider sphere — for example, that the interaction of two volume of hydrogen and one of oxygen in producing $H_2O$, is true of all water in the world, at all times — though even this assumption is subject to certain definite exceptions. In

relation to the movement of the blood, Galen, Colombo, Vesalius had performed experiments before Harvey; Fabricius and others before him had seen the valves in the veins. All these however either misunderstood their results or obtained only a partial comprehension of what they saw. But apart from this, Harvey was definitely the first to apply demonstrative experimental tests and comparative observations for the solution of biological problems that interested him. Thus he became the pioneer of that dynamic biological outlook which so profoundly altered ancient physick that it became modern medicine and contemporary biology.

Harvey's conclusions in relation to both the circulation and embryogenesis were rudimentary and in part fallacious, because of the difficulties that beset the pathfinder, however expert and sharpsighted. Moreover, Harvey must have known Bacon's aphorism that if you torture nature by experiment, she would yield the right answer. It has taken well nigh three centuries to prove how much more reliable evidence can be obtained by skilful and patient cross-examination.

Meyer (1936) remarks on p. 145:

> When reflecting on Harvey's many and great merits, one cannot, as has been done, justly single him out for credit, because he used hen eggs. They had been used by the Greeks and also by his teacher Fabricius, by his contemporary Highmore and by his predecessors Coiter and Aldrovandus.

Of course, Fabricius inspired Harvey to examine incubated eggs; but Harvey observed more accurately, attempted to correlate observations more acutely, extended his studies to the embryogenesis in mammals, improved on the work of his predecessors. it cannot be said that any of his contemporaries, Parisanus, Highmore, Fludd, or Digby obtained more reliable conclusions. From the Introduction of his Exercitationes it can be gathered that Harvey set out to disprove the Galenic hypothesis that conception was the outcome of a mixture of male and female semen. It must be admitted that this was achieved, as was also the negation of the Aristotelian hypothesis regarding menstrual blood+semen. Unfortunately Harvey speculated further on the results of his experimental observations, because his tests were made on an unsuitable object, *Cervidae,* and did not correct his false conclusions.

Harvey has been reproached for his neglect of chemical methods, even when these could not have provided a solution of the problems that interested him. In Ex. 37 Harvey recorded a "kitchen experiment" to support the erroneous contention that the yolk and white were produced at the

same time; this was against the correct interpretation of Fabricius who taught that the egg-white was added by apposition. Still, it can be said that the example of Robert Boyle (1632–1691) would be available far too late in Harvey's lifetime and that the writings of Jean Baptiste van Helmont (1577–1644) would be too abstruse for the London physician's comprehension; moreover they appeared posthumously in 1707. Highmore (1651) provided an example of "chemical" approach to the problems of generation.

If on the basis of unfortunate observations Harvey reasoned out conclusions that have proved wrong, it should be remembered that he was the very first to cast a doubt on the validity of spontaneous generation and to supply sound alternative explanations for the sudden appearance of insects in muddy places. It is noteworthy that Redi's clever tests were inspired by Harvey's writings. Though Harvey had the acumen to recognize that seeds or germs might be so small as to be invisible to the naked eyes, and though Girolamo Fracastoro had paved the way by his views on *contagia*, Harvey did not follow this train of thought in relation to the fertilization of the ovum. He would have then garnered as much praise as he now has deserved sharp criticism.

Thus, though in both the problems be investigated — the movement of the blood and the many obscurities of generation — Harvey did not provide a complete answer, yet in both he made original and far-seeing contributions to factual knowledge and his writings provided the stepping stones leading to the solution of vast biological problems.

## XIV. Epicritical Remarks

It will be objected that it does not really matter whether the present day judgment on the relative merits of *De motu* (1628) and *De generatione* (1651) is justified or not; also, that when the fate of empires is in the balance, there will be few, if any, to care and decide whether William Harvey was a clear-sighted biologist or a muddle-headed medical practitioner. I disagree, because many of our present day troubles are due to a neglect of the lessons of the past or a misunderstanding of historical events, some of which can be more easily comprehended if explained in terms of contemporary scientific knowledge. The history of medicine should be — and is — more accurate in its conclusions than political history; for though there is no means of ascertaining whether the Trojan War was really due to Helen's glamorous fascination and not instead to a dispute about the trading possibilities of Asia Minor, we can decide that

the pestilence among the Greeks was due to *Bacterium pestis* and not to the arrows of Apollo. Then the history of science — and that of medicine — is based on factual and documentary proof. The 1494 Italian campaign of Charles VIII of France may (or may not) have heralded the Renaissance, as some French historians aver; but what is certain is that it was followed by the spread of a dangerous contagious disease, syphilis, whose far-reaching social consequences are still noticeable today.

Then the influence of dynasts on the course of events is not easy to assess, in view of the unreliability of biased contemporary testimony; instead, in relation to Science and Medicine, the role played by outstanding figures can be relatively accurately recognized by a careful reading of existing documentation, though even there national prejudice may render a decision difficult; examples of this can be daily discerned. Fortunately, scientific hagiography can more easily be critically examined than any other variety; for this reason a renewed review of Harvey's achievements and faults can still be usefully undertaken.

SUMMARY

The majority of modern critics consider *De motu* (1628) far superior to *De generatione* (1651); nonetheless, the two works can be evenly compared, because merits and flaws are evident in both. For in both Harvey made an initial attempt to correlate the lessons of clinical observation, biological demonstrative experiment, and comparative anatomy, and then reported truthfully on what he saw. It can be conceded that the demonstration of the mechanical circulation of the blood yielded correct even if incomplete results, whilst the pioneer observations and tests on does in Windsor Park did not. Indeed, the choice of animals with an abnormal embryogeny ended by enmeshing Harvey in futile speculation, which he garbled still worse by a peculiar intellectual perversity which distorted evidence into agreeing preconceived notions.

Still — by examining embryogeny in mammals, by postulating the universal origin of living animals from eggs, by reformulating the Aristotelian doctrine of epigenesis, by doubting the occurrence of spontaneous generation — all these opinions, however faultily pronounced, provided the correct incentive for those investigations that eventually achieved the triumphs of contemporary biological medicine. It is suggested that in the history of medical progress the significance of both these books is equally great; a study of both is essential to obtain a clear conception of Harvey's personality.

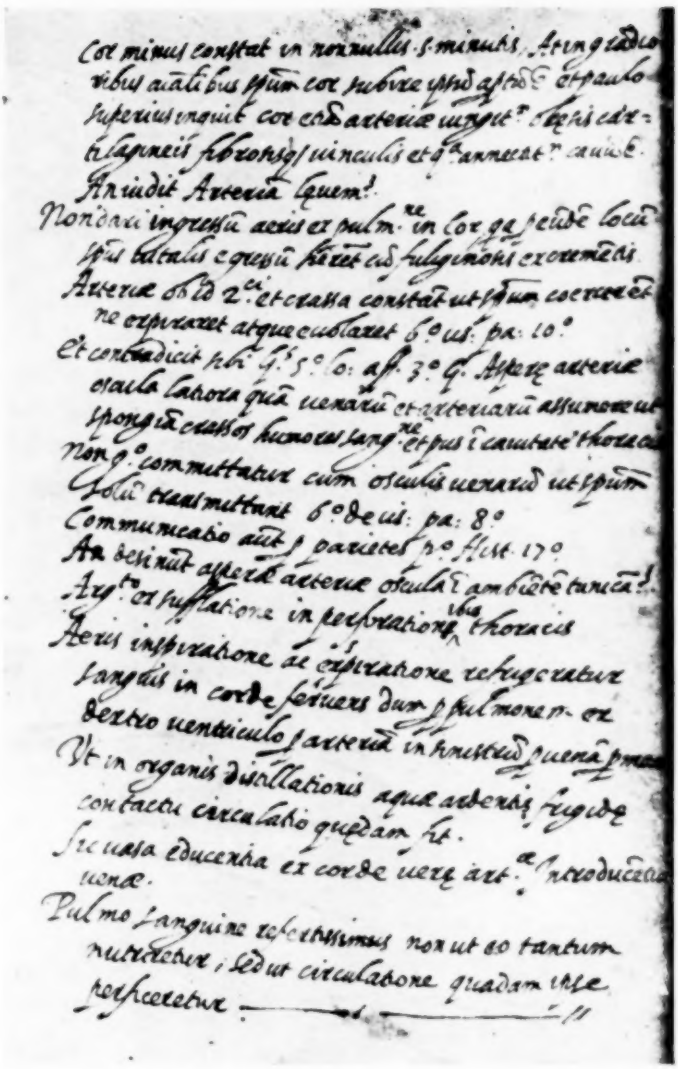

FIG. 1. A page from the class notes of an unknown student of Cesalpino's lectures in Pisa during 1590. (From a manuscript in the Bodleian Library, Oxford. Courtesy the Bodleian Library, Oxford. Plate by favour of the Royal Society of Medicine.)

F.G. 2. Harvey's handwriting, explaining the reasons which persuaded him that the whole blood moved round in a circle as the result of the action of the heart. (Fol. 80$^{v}$ of his autograph Lumleian lecture notes preserved in the British Museum. Courtesy the British Museum. Plate by favour of the Royal Society of Medicine.)

# The Anatomical Library of Dr. Richard Mead (1673-1754)

K. F. RUSSELL*

ALTHOUGH Richard Mead and his library have been the subject of a number of papers and memoirs, little attention has been paid to a critical survey of the contents of his library. It was therefore thought that a survey of the anatomical section would prove of interest and it is as the result of such a survey that this paper was written.

Richard Mead was born on 11 August 1673, the eleventh child of Matthew Mead, a nonconformist divine, at Stepney, Middlesex. His early education was in the hands of a private tutor and in 1689 he entered the University of Utrecht to study classical literature and antiquities under Graevius. In 1692 he moved to the University of Leyden to study medicine, and in 1695 travelled to Italy and graduated M.D. from the University of Padua in the same year (16 August).

He returned to England in 1696 and set up his practice at Stepney. He began his career as an author in 1702 with the publication of his *Mechanical Account of Poisons*. As a result of this publication he was made a Fellow of the Royal Society in 1703. He was elected to the Council of this Society in 1705 and again in 1707 and remained on the Council until his death, being Vice-President in 1717.

His career as a physician really commenced on 5 May 1703, with his appointment to the medical staff of St. Thomas's Hospital. Because he was a graduate of a foreign university he was not eligible for the College of Physicians. So, on 4 December 1707, he graduated M.D. Oxford and in the next year (25 June) was admitted a candidate of the College of Physicians. He became a Fellow of this College on 9 April 1719, Censor in 1719 and 1724, Harveian Orator in 1723 (Oct. 18), Elect on 25 November 1735, and in 1745 was chosen as President, but declined the honour. He was Consiliarius in 1745, 1747, and 1748. On 7 May 1745, he was appointed an Honorary Fellow of the College of Physicians of Edinburgh.

Although Mead was preeminently a physician and indeed one of the greatest physicians of his time, he took a keen interest in anatomy, a fact which led to his appointment on 16 August 1711, to the position of

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Anatomy Reader to the United Company of Barbers and Surgeons, a position which he held for four years. It is entered in the records of the Company that "on the 24, 26 and 27 days of Dec. 1711 was held at the Hall a public lecture upon the Muscles performed by Dr. R. Mead being Alderman Arris's gift." It must have been this interest in anatomy which prompted him to obtain so many of the anatomical works which adorned his library.

The culmination of his work as a physician came in 1727 when he was appointed Physician to George II, although he had previously treated royalty when he was called in to attend to Queen Anne two days before her death and the fact that he predicted her early demise added greatly to his reputation.

Mead died on 16 February 1754, at his home in Great Ormond Street and on the 23 February was buried in the Temple Church.

Mead was the author of the following papers and books:

1702 *A Mechanical Account of Poisons,* London 8vo.

1703 Paper to the Royal Society giving an account of Bonomo's discovery of "Acarus Scabiei."

1704 *De Imperio Solis ac Lunae in Corpore Humano, et Morbis inde oriundis,* London 8vo.

1720 *A Short Discourse Concerning Pestilential Contagion, and the Methods to prevent it,* London 8vo.

1724 *Oratio Anniversaria Harvaeiana; accessit Dissertatio de Nummis quibusdam a Smyrnaeis in Medicorum honorem percussis,* London 4to.
Edited William Cowper's *Myotonia Reformata: or an Anatomical treatise on the muscles of the Human Body,* London folio.

1741 Paper to the Royal Society on an invention of Samuel Lutton for ventilating the holds of ships.

1744 *A Discourse on the Plague,* London 8vo.

1747 *De Variolis et Morbillis, Accessit Rhazis de iisdem Morbis Tractatus,* London 8vo.

1749 *Medica Sacra: Sive de Morbis insignioribus qui in Bibliis memorantur, commentarius,* London 8vo.
*A Discourse on the Scurvy,* London 8vo.

1751 *Monita et Praecepta Medica,* London 8vo.

All of his books went through a number of editions, the most popular being the one on the plague.

Mead's interests outside of medicine were wide and varied. His high regard for classical literature and the study of antiquities was fostered by his early education at Utrecht. His library and his table were graced by

the artistic and literary giants of his age. He was an avid collector of pictures, coins, and antiquities of all kinds and his collection of these sold after his death for £10,550.17.0 (Pictures £3417.11.0, Prints and Drawings £1908.14.0, Coins and Medals £1977.17.0, Antiquities £3246.15.0).

In his home in Great Ormond Street he had built a gallery for his library and collection, a spacious room 60 feet long which was open to anyone interested in these matters and in which he was wont to hold receptions for his friends and artistic acquaintances. He constantly maintained a staff of scholars and artists.

The catalogue of the sale of his library, sold by Samuel Baker in two sections in 1754 and 1755, lists 6,827 items, which brought the sum of £5,496.15.0. This catalogue makes most absorbing reading. The priced copy in the present writer's collection formerly belonged to Thomas Frognall Dibdin, the famous bibliophile, and has annotations by him.

The medical section of his library was relatively small compared with the enormous number of works on classical and general literature. These medical works, preponderantly devoted to anatomy, show in their selection, the hand of a man who was both a keen student and an ardent bibliophile.

As might be supposed the greater proportion of the anatomical works were published during Mead's lifetime (amongst others are seen books by Albinus, Bellini, Berrettini, Bianchi, Bidloo, Cheselden, Cowper, Douglas, Duverney, Haller, Heister, Keill, Morgagni, Pacchioni, Peyer, Santorini, Tarin, Valsalva, etc.). These might well be termed the contemporary textbooks of a learned anatomist. Many of these, probably, were presentation copies to Mead.

It is to the older authors in his collection that most interest is attached. These would have been obtained by Mead perhaps mainly for their bibliographical interest. As will be seen in the appended catalogue very few of the old anatomists escaped Mead's notice.

Gaspar Aselli (1581–1626) is represented by his most famous work *De Lactibus sive Lacteis* 1627, the first book to have plates printed in colors.

John Banister's (1533–1610) *Historie of Man,* 1578, is noted.

Caspar Bauhin (1550–1624) is represented only by his *De Hermaphroditorum . . . Natura,* 1614.

Two works of Berengario da Carpi (1470–1530) are present; his *Isagoge Breves,* 1530, and the *Anatomia Humani Corporis,* 1535.

The most notable book of Julius Casserius (1561–1616) is his *De Vocis Auditusque Organis,* 1600.

Hieronymus Fabricius (1537–1619) is represented by his *De Visione, Voce, Auditu,* 1600.

The works of William Harvey (1578–1657) are naturally well to the fore. Of the *De Motu Cordis et Sanguinis,* Mead had the following editions: 1628 (brought the large sum of 4/6 at the sale!), 1639, and 1737, while the *De Generatione* was there in the London 1651 (sold for 2/-) and 1737 editions.

The rare book of Nicholas Massa (d. 1569) *Liber Introductorius Anatomiae,* 1536, brought 2/6.

Mundinus de Luzzi (1275–1326) obviously attracted Mead as a bibliophile, since he possessed four editions of the *Anathomia Mundini.* These were the Pavia, 19 December 1478 (brought £1.13.0); Strassburg, 1513; Bononiae, 1521, with the commentary of Berengario; and the Dryander edition of Marburg, 1541.

Charles Estienne (Stephanus) (1503–1564) is present in his *De Dissectione Partium Corporis,* 1545, (brought 2/6).

The *De Nervis Opticis,* 1573, of Constanzo Varolio (1543–1578) was another "old master" which went for 2/6.

It was to the father of modern anatomy that Mead paid most attention for Andreas Vesalius (1514–1565) was represented by a most notable series of volumes. Taking pride of place was the copy of the *De Humani Corporis Fabrica Librorum Epitome,* 1543, printed throughout on vellum; this almost unique copy fetched £8.12.6 and is now in the British Museum. There was also the *Epitome,* 1616, with the commentary of Peter Paaw (1564–1617). The *De Humani Corporis Fabrica* was represented by the 1543 (fetched £2.3.0) and the 1555 (£2.15.0) editions. The first English edition of Vesalius edited by Thomas Geminus (London 1552) is present in the undated issue (brought 2/6). Other editions of Vesalius are the 1642 issue with annotations of Nicholas Fontani and the *Opera Omnia Anatomica et Chirurgica,* edited by Boerhaave and Albinus, 1725. To complete the list of Vesalian items there is a copy of his *Epistola Radicis Chynae,* 1546.

Of Vesalian interest are the books of Franciscus Puteus and Gabriel Cuneus. The former, who wrote a book *Apologia in Anatome pro Galeno,* 1562, bitterly attacked Vesalius and his work. This resulted in a reply from Cuneus, contained in *Apologiae Francisci Putei pro Galeno in*

*Anatome Examen*, 1564, which defended Vesalius. Many authors, including Douglas, Boerhaave, Albinus, Haller etc., state that Gabriel Cuneus was a pseudonym for Vesalius and that the latter actually wrote the book; this view is opposed by Roth. The work is included, however, in many of the collected works of Vesalius.

BIBLIOTHECA MEADIANA;

SIVE

CATALOGUS LIBRORUM

RICHARDI MEAD, M.D.

QUI

Proſtabunt Venales ſub Haſta,

Apud SAMUELEM BAKER,

In Vico dicto *York Street*, *Covent Garden*, *Londini*,

*Die Lunæ*, 18vo. *Novembris*, M.DCC.LIV.

ITERUMQUE

*Die Lunæ*, 7mo. *Aprilis*, M.DCC.LV.

Γεῦμα τὴν αὐγὴν καλεῖ. EURIPID.

CATALOGI venundantur apud plurimos Londini Bibliopolas, et in omnibus Urbibus Europæ celebrioribus, unius Solidi Pretio.

The title page of the sale catalogue of Richard Mead's library. The copy in the present writer's possession formerly belonged to Thomas Frognall Dibdin, the noted bibliophile.

The last of the anatomical treasures to be noted is the *Liber Anathomiae Corporis Humani,* 1502, of Gabriel de Zerbi (1468–1505).

From a purely commercial outlook it is interesting to note that the books published during Mead's lifetime brought, on the average, a higher price than those printed earlier. Outstanding examples of this statement are shown with the 1724 edition of William Cowper's *Myotonia Reformata* which was edited by Mead and brought £6.0.0, and the 1698 edition of Cowper's *The Anatomy of Human Bodies* which brought £10.10.0. A series of original drawings and proof plates for the *Myotonia Reformata* were sold for 6/6.

The list of anatomical works which follows has been extracted from the sale catalogue. The title of each item has been expanded by the present writer and where possible the printer has been added to the description. Where some doubt exists as to the actual book or edition listed, the alternatives have been given. Only books dealing with human anatomy have been listed.

ALBINUS, Bernard Siegfried (*1697–1770*). De ossibus corporis humani. Leiden, 1726. 8vo. (Date entered as 1676 but probably refers to above).

Icones ossium foetus humani accedit osteogeniae brevis historia. Leiden, 1727. 4to. (May refer to Leiden: Joh. & Herm. Verbeek 1737).

Historia musculorum hominis. Leiden, Theod. Haak and Hen. Mulhorius, 1734. 4to.

ANONYMOUS. Isagoge Anatomia: Anonymi introductio anatomica. Cum interpretatione Laurembergii. Lugduni Batavorum, 1618. 4to.

Anonymi introductio anatomica. Lugduni Batavorum, 1744. 8vo.

ARANTIUS, Julius Caesar (*1530–1589*). De Humano foetu opusculum. Venice, 1595. 4to.

ASELLIUS, Gaspar (*1581–1626*). De Lactibus sive lacteis venis quarto vasorum mesaraicorum genere novo invento. Mediolani, Jo. Bapt. Bidellius, 1627. 4to.

BANISTER, John (*1533–1610*). The Historie of Man, sucked from the Sappe of the most approved Anathomistes, in this present age, compiled in most compendious fourme, and now published in English Etc. London, John Daye, 1578. folio.

BARTHOLIN, Caspar, the younger (*1655–1738*). Diaphragmatis structura nova. Paris, L. Billain, 1676. 8vo.

BARTHOLIN, Thomas (*1616–1680*). Historiarum anatomicarum rariorum centuria. Hafniae, 1654. 3 vols. 8vo.

BAUHIN, Caspar (*1550–1624*). De hermaphroditorum monstrosorumque partium natura. Oppenheim, H. Galler, 1614. 8vo.

BELLINI, Laurentius (*1643–1704*). Discorsi di Anatomia. Florence, 1741–1744. 2 vols. 8vo.

BERENGARIO DA CARPI, Giacopo (*1470–1530*). Isagoge breves perlucidae ac uberrimae in anatomiam humani corporis. Argentorati, Henr. Sybold, 1530. 8vo.

Anatomia humani corporis ad suorum scholast. preces in lucem data. Venice, Bernard de Vitalibus, 1535. 4to.

BERRETTINI, Petrus (*b. 1669*). Tabulae Anatomicae a Petro Berettino delineatae. Rome, Ant. de Rubeis, 1741. folio.

BIANCHI, Giovanni Battista (*1681–1761*). Historia hepatica, seu theoria ac praxis omnium morborum hepatis et bilis cum eiusdem visceris anatome. Geneva, 1725. 2 vols. 4to.

BIDLOO, Godfrey (*1649–1713*). Anatomia corporis humani centum et quinque tabulis . . . Amsterdam: Joa. a Someren, 1685. folio.

Exercitationes anatomicae. Lugd. Batav., 1708. 4to.

BONETUS, Theophilus (*1620–1689*). Sepulchretum sive anatomia practica ex cadaveribus. Geneva, 1700. 3 vols. 4to.

BRIGGS, William (*1642–1704*). Ophthalmographia sive oculi ejusque partium descriptio anatomica. Cambridge, Joannes Hayes, 1676. 8vo.

CALDESI, Giovanni. Osservazioni Anatomiche. Florence, 1687. 4to. (I am unable to trace this item in any reference works.)

CARCANUS, Johannes Baptista. De Corde et de musculis oculis deservientibus. Ticini, 1574. 8vo.

CASSEBOHM, Johannes Friedrich (*d. 1743*). Tractatus quinque anatomici de aure humana. Halle, 1734–1735. 4to.

CASSERIUS, Julius (*1561–1616*). De vocis auditusque organis historia anatomica. Ferrara, V. Baldinus, 1600. folio.

Pentaestheseion hoc est de quinque sensibus liber. Venice, Nich. Misserinus, 1609. folio.

CESIO, Carlo (*1626–1686*). Anatomia dei pittori. Cognizione dei muscoli del corpo umano per il desegno. Rome, 1697. folio.

CHESELDEN, William (*1688–1752*). Osteographia, or the anatomy of the bones in 56 plates. London, 1733. folio.

Anatomy of the Human Body. London, 1740. 8vo.

COCCHI, Antonio (*1699–1747*). De usu artis anatomicae. Florence, 1736. 4to.

Dell' Anatomia Discorso. Florence, 1745. 4to.

COITER, Volcher (*1534–1600*). Externarum et internarum principalium humani corporis partium tabulae. Nuremburg, T. Gerlachius, 1573. folio.

COLOMBO, Matteo Realdo (*1516–1559*). De Re Anatomica Libri xv. Venice, N. Bevilacqua, 1559. folio.

CONGRINGIUS, Herman (*1606–1681*). De Sanguinis generatione et motu naturali. Leiden, F. Hackius, 1646. 8vo.

CORCELLES, D. C. de. Icones musculorum plantae pedis descrip. Leiden, 1739. 4to.

COWPER, William (*1666–1709*). The Anatomy of the Humane Bodies, with figures drawn from the life by some of the best masters in Europe. Oxford, Sam. Smith and Benj. Walford, 1698. folio.

Glandularum quarundam nuper detectarum ductuumque earum excretiorum descriptio cum figuris. London, for S. Smith and Benj. Walford, 1702. 4to.

Myotonia Reformata: or an Anatomical Treatise on the Muscles of the Human body. London, R. Knaplock, 1724. folio. (Edited by Richard Mead.)

Drawings and Proof plates of "Cowper's Muscles."

CUNEUS, Gabriel (*d. 1573*). Apologiae Francisci Putei pro Galeno in anatome examen. Venice, F. de Franciscis, 1564. 4to.

DIEMERBROECK, Isbrand Van (*1609–1674*). Opera omnia anatomica et medica. Ultrajecti, 1685. folio.

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# Asclepius: A Review

KURT VON FRITZ*

THE authors of the two volumes under review[1] have undertaken for the first time to collect all the available written evidence concerning the origin, character, cult, and worship of the ancient Greek — and later also Roman—god Asclepius,[2] the god of medicine, and to derive from this evidence, as far as possible, a complete history of this important section of ancient religion in all its various aspects.

The first volume contains the testimonies, both Greek and Latin, in systematic order, and arranged in the following sections: 1. Legend; 2. Descendants; 3. Deification and Divine Nature; 4. Medicine; 5. Cult; 6. Images; 7. Sanctuaries, with many subdivisions of each of these main sections. All testimonies are first reproduced in the original language and then in English translation. The literary evidence has, on the whole, been printed in full, with the exception of those cases in which there seemed to be complete duplication. The epigraphic evidence collected by the authors has not been printed in full, which is only reasonable since many of the thousands of brief dedicatory inscriptions that have come down to us from antiquity are interesting only because of their number. Their content adds nothing to our knowledge. The numismatic and archaeological evidence has been eliminated completely, since the authors felt rightly that a collection of this material would have to follow different principles of selection and could be undertaken only by a professional archaeologist. Nevertheless one may perhaps ask whether a little less consistency in this respect might not have had certain advantages. Especially would the insertion, in an appendix, of a few representative images of the god, even if undertaken without any claim to completeness or systematic arrangement, have been most welcome, since in the second volume the authors cannot altogether avoid the discussion of some iconographic details which

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[1] Asclepius. *A Collection and Interpretation of the Testimonies.* By Emma J. Edelstein and Ludwig Edelstein. Publications of the Institute of the History of Medicine, The Johns Hopkins University, Second Series: Texts and Documents II. 2 vols. Baltimore: The Johns Hopkins Press, 1945. xiii+470, x+277 pp. $7.50.

[2] Following a usage which has become more and more generally accepted in this country in recent years but one that was abhorred by most European philologists, at least before the second world war, the authors use neither a direct transcript of the Greek name, which would be Asklepios, nor the Roman adaptation of the name of the god, which was Aesculapius, but a modern romanization of the Greek name: Asclepius.

are of special importance for a full understanding of the character of the god and of his cult.

The second volume contains a very thorough and excellent analysis of the evidence contained in the first volume under the following headings: 1. The Hero Asclepius; 2. The God Asclepius; 3. Temple Medicine; 4. Cult; 5. Images; 6. Temples. The first four, and more specifically, the first three chapters, deal, in a most lucid and penetrating manner, with the more important problems presented by the interesting association and interpenetration of religion and medicine which the cult of Asclepius represents. The last two chapters are more or less in the nature of a supplement or an appendix. Strictly speaking, they belong to the field of archaeology which the authors have tried to avoid. Yet it was not possible to exclude archaeological subjects altogether, and this for two reasons: 1. The literature mentioning Asclepius contains also descriptions of his images and temples, sometimes inextricably connected with discussions of the god himself or of his cult. 2. Some parts of the archaeological evidence in the narrower sense of the word, especially the appearance and the attributes of the god in his images, and the chronology of the temples dedicated to him, have so great an importance for the solution of the problems discussed in the first chapters that they could not be entirely omitted from the work. But the authors do not go any further into detail than is absolutely necessary for this purpose and, therefore, exclude everything that either has no bearing on the problems discussed in the first chapters or would require the training of an archaeologist in order to deal with them in a satisfactory manner.

The first two chapters try to solve the problem of the origin of the god Asclepius and to answer the closely related question of who was earlier, the god or the hero Asclepius. The evidence in this respect, as the authors have shown, is very clear and leaves no doubt whatever that the god Asclepius is of comparatively late origin, and was created in Epidaurus hardly earlier than the beginning of the fifth or the end of the sixth century B.C., while the hero Asclepius is much older and was already known at the time when the Homeric epics were written. This is a welcome refutation, in an individual case, of the theory, advanced by some historians of religion, that all heroes were originally gods, who, however, later, for some reason, lost their full divine rank and stature. In fact there is truly overwhelming evidence to show that the worship of and the belief in heroes, on the one hand, and the cult of gods on the other were, from

the beginning, quite different and separated from one another and that the degradation of an original god to the rank and stature of a hero, which may have happened in individual cases, presupposes this difference and did not produce it. In Asclepius, then, one finds a clear case of the opposite development, the elevation of an original hero to the rank of a god, and this in the clear light of history. This is all the more interesting because, as the authors have shown, it took a very long time before the god became really the equal of other gods and until his somewhat inferior origin was completely forgotten. Yet the Delphic Oracle had begun to support his full divinity very soon after he had been elevated to godhead by the priests of Epidaurus and never wavered in this support while, at the same time, the popularity of the new god with suffering mankind increased rapidly and soon spread even beyond the boundaries of Greece.

But what was the origin of the hero? In dealing with this problem the authors seem considerably puzzled by the fact that the hero Asclepius does not display any outstanding "heroic" qualities anywhere in Greek legend. At this point of their investigation, however, the authors appear somewhat unduly influenced by the Homeric — and modern — notion of a hero. In the Homeric poems, it is true, all Greek warriors are sometimes addressed as heroes, though these cases are extremely rare, and vice versa, all heroes are, to some extent, described as warriors, though, as the authors themselves have pointed out, in the Homeric doctor-hero Machaon this warlike element is not very prominent. He is much more a physician than a fighter. In this respect, however, the Homeric poems are not quite representative of Greek religious and semi-religious beliefs, at least not those of the Greek motherland.

The legends and stories connected with the Greek heroes of the motherland, who enjoyed local worship — which, with a very few exceptions, was not the case with the heroes of the Homeric poems, and even, to some extent Attic tragedy—show very clearly that *hero* did not originally mean a warrior. A hero was a man who, either through his actions or through what had happened to him, had left such an imprint on the place or country in which he had lived that the presence of his spirit was still felt long after his death. A hero, therefore, might be a great lawgiver, a prophet, a ruler, or simply a man who had suffered such a terrible fate or had been wronged in so outrageous a fashion, that he could not be forgotten. Of course he could also have been a warrior. But this was

by no means a necessary condition of a man's becoming a hero. Much less was being a warrior, even a warrior who had performed the most "heroic" deeds, sufficient for a man to become a hero after his death. This, it is true, seems different in the Homeric poems, from which the modern notion of hero is ultimately derived. But the reason is not difficult to find. The warriors of the Trojan War had become so glorified by many generations of poets and rhapsodes — for even if the Iliad as we have it is the work of one great poet there can be no doubt whatever that it has a long pre-history — that finally they as a group achieved an immortality similar to that of the individual local heroes and therefore might be called by the same name.

These considerations concerning the nature of a Greek hero may seem rather remote from the interests of a historian of ancient medicine. Yet there is perhaps a connecting link. In the first place, if what has been said is correct, the possibility or probability that Asclepius actually lived before he became a hero and then a god is hardly so negligible as the authors seem to think. It is of course true that, once the belief in heroes was firmly established, there could also arise composite heroes who had not actually lived, just as it has been shown that there are or have been local saints, who were the product of popular imagination or even of literary invention, even though the great majority of saints, the real saints, have actually lived as human beings. The name of Asclepius certainly, and the fact that the second part of his name can be understood to refer to one of the most outstanding character traits of the hero and the god, can hardly be considered as sufficient evidence for the assumption that he cannot have been a historical personality, especially since no satisfactory explanation has ever been found for the first part of the name and since its division into two parts is also contestable. With how much more justification would it be possible to contend that Socrates was a mythological figure because his name fits his character so well — if we did not know so much about him.

At any rate, however, whether Asclepius actually lived as a great physician and benefactor of mankind and only later became the patron saint and god of medicine, or whether he began his existence as a composite figure and the idea of a physician, there can be hardly any doubt that, when he was still only a hero and not yet a god, his connection with scientific or semi-scientific medicine when it was still in its early beginnings was very close, and probably closer than later when he had become

a god. For though the god, as the authors have shown in a very lucid fashion, had at all times very close and interesting relations with contemporary medicine, he, as a god, like all Greek gods and in spite of his particularly mild and benevolent character, kept at a distance all human beings, including his human colleagues in the field of medicine.

To the historian of medicine the relations between the god and contemporary professional medicine are probably the most interesting topic in the work under review. In fact these relations are in many respects very puzzling and present many problems. There seems to be absolutely no evidence to show that in the famous temple at Epidaurus or in other temples of the *god* Asclepius, medicine was practiced by human beings or that the priests themselves gave medical advice to the faithful who came to seek the help of the god. All help was given by the god himself, and it was given through dreams and not through the priests or other human intermediaries. Yet though many of the cures attributed to Asclepius are miraculous, he does not, in a certain sense, seem to have worked miracles by merely telling a patient that he was well again, and lo! his illness had disappeared. He acted like a true physician though sometimes in a rather miraculous fashion. One of the strangest aspects of this activity of the god is presented by his surgical operations. In most cases the patients seem to have dreamed the operation, though sometimes we get a report of what might seem to have been an actual operation; as for instance in T 423, 25 (vol. 1, p. 226), where a woman tells how she had slept in the temple in vain, but on her way back home was met by "a man of fine appearance" who operated on her in the presence of her companions so that she came home cured. Even in this case, however, one is not quite sure whether the whole incident did not happen merely in the lady's imagination. This latter element stands out very clearly in another case (T 423, 13), where a man tells how his stepmother had tricked him into drinking leeches to the great detriment of his health. He dreams that the god cuts his chest open with a knife and removes the leeches. When he wakes up he goes away cured. Nevertheless, even in this case, as in many others, some material evidence of the actuality of the operation is found when the patient wakes up: the leeches that have been removed from the chest, a spearpoint that had remained stuck in the body of a soldier and that human physicians had not been able to remove, or simply a blotch of blood on the floor.

Most often, however, the god did not cure the patients by surgical

operations performed in their dreams, but by telling them what remedies they should use or what dietary rules they should follow. The authors have shown that, in prescribing these cures, the god followed the medical fashions of the various periods rather closely, at least in a general way. That is, if in a given period a certain type of therapeutic method was especially fashionable with the medical profession, the god would also make especially frequent use of that method in this period. On the other hand, the ancient testimonies very often stress the fact that, in regard to the details of the treatment, the advice of the god was not infrequently the very opposite of what the most outstanding doctors of the time would have considered the correct therapy. For instance, cold water treatment where the medical profession would have advocated hot baths, or the use of drugs which acknowledged medical theory considered more harmful than beneficial in case of the specific disease for which the drug was prescribed by the god. Yet there are a great many testimonies from grateful patients attesting amazingly quick and complete cures in seemingly desperate cases effected by this divine therapy.

The authors have taken great pains to discuss the various ways in which these striking phenomena may find a rational explanation, admitting however that it is impossible to arrive at a definite solution in every respect. The space available for a review is much too small to take up these questions in detail. But one must certainly say that the testimonies concerning the activity of this Greek god who practiced medicine in almost the same way as a human physician — only, it seems, with more striking success—present the most fascinating problems and throw most interesting sidelights on the nature of medicine as an art of dealing with human beings and on the human mind in general.

The testimonies discussed so far show that the god, while, on the whole following the development of professional medicine, asserted at the same time his independence from and superiority to his human colleagues. This, however, does certainly not mean that the god was jealous of or hostile to his human competitors. On the contrary, he was very much in favor of the human science and art of medicine. In the second century A.D. we find that at the annual festival of the god in Ephesus there was a scientific contest of physicians with prizes in various fields, as, for instance, presentation of a scientific thesis, surgery, invention of new surgical instruments, and so forth. But as far back as the fifth century B.C. at the very latest, and probably a good deal earlier, the physicians of the

famous medical school of Cos considered themselves as children of the god and celebrated him annually by a splendid procession.

This relation of the god to the medical profession presents many interesting problems about which one would like to know more than the authors have been able to find out on the basis of the available evidence, which, unfortunately, is rather scanty. The careful analysis of this evidence by the authors leaves hardly any doubt that the cult of the *god* Asclepius originated in Epidaurus. Yet there are also very strong indications to show that the worship of the *hero* Asclepius in Cos was still a good deal older, though it was not until later and under the influence of Epidaurus that the hero became a god also in Cos. If this is so, the connection between Asclepius and the famous and perhaps oldest school of scientific medicine on the island of Cos must have been very old and very close, much closer certainly than the relation between the god and his human colleagues at Epidaurus. In fact, it looks as if Asclepius, after he had become a god, was on much less intimate terms with the human representatives of his art than he had been as a hero and that, especially in the first centuries after his elevation to godhead, he kept rather aloof from the latter, though never becoming hostile, until, in a still later period, he became again, in some places, their benevolent patron.

There are a great many other most interesting aspects of the myth and cult of Asclepius in antiquity, which have been discussed by the authors, but cannot be mentioned within the limited compass of a review. In conclusion, it is only just to say that both the collection of the testimonies and the penetrating analysis of these testimonies in the second volume present most interesting reading for the historian of medicine as well as for the historian of ancient religion.

VICTOR ROBINSON

UNIV. OF MICH.

# Victor Robinson (1886-1947)

GEORGE ROSEN

THE death of Victor Robinson on January 8, 1947, removed from American medical history one of its leaders and pioneers. The contribution which he made to this field was unique, for it rested on a passion for history and a love of medical literature linked by the intensity of a poet. No one who listened to him lecture, or who met and talked with him, ever forgot him. Victor Robinson's ability to bring before his contemporaries the drama, the color, and the vitality of the medical past was simply a development of his sensitive appreciation of and vital interest in people. Modesty, gentleness, keen perception of humor, and ability to listen were qualities that endeared him to his friends. The present writer cherishes the recollection of sundry spring and summer afternoons spent in visiting with Dr. Robinson at 4 St. Luke's Place. Outside, the subdued rumble of traffic, the shouts of children at play, and all the sounds that enter into the auditory environment of downtown New York, but seated at Dr. Robinson's desk in his library, one heard little of all this. Pleasant conversation, exchange of ideas, and the privilege of listening to a cultured man who was on friendly terms with the historical figures of whom he wrote, conspired to annul for a brief interval the fleeting of time.

The grain of the man may be glimpsed from an autobiographical sketch written not long before his death. He wrote:

> There is nothing in my career to excite a publicity department. Father was a prosperous physician, and the author was brought up in a bourgeois household of comfort and culture. I never walked the streets looking for a job (never had a job of any kind); was never hungry (except between meals) and have never been arrested (as yet). So, you see, I do not make "good copy."
>
> Mary Lou McDonough tried to make an interesting story of my life when she included three of my poems in her anthology of medical poetry written by physicians.* Mrs. McDonough submitted a biographical sketch in which she tried to make much of the fact that I had accomplished so much although coming from the little Ukraine. I had to scotch the story, because the Ukraine is not little, and because I arrived in this country in my infancy — therefore my birth in the Ukraine had nothing to do with the case.
>
> As I had the advantage of education, I cannot consider myself a self-made

* "The Healing Hands; Tuberculosis; Hasheesh," *Poet Physicians* (Charles C. Thomas) 1945) 172-173.

man. In one respect, however, I am self-taught: the History of Medicine and Allied Sciences. There were no courses in these subjects in my student days, and I may be considered the first American "specialist" in the History of Medicine, as I was among the earliest to devote almost full time to this specialty. I founded and edited *Medical Life* (1920–1938), the only monthly of medical history in the English language. In 1929, I became Philadelphia's first professor of the History of Medicine when this chair was created for me at Temple University School of Medicine.

Son of the late Dr. William J. Robinson, the well-known dermatologist, and Marie Halper Robinson, Victor Robinson was born in the Ukraine on August 16, 1886, and was brought to this country while still a child. It took a while before he found his true vocation — the study and teaching of medical history. First, he studied at the New York University Law School, but finding the law arid and uncongenial, he turned to pharmaceutical chemistry, receiving a Ph.G. degree from the New York College of Pharmacy in 1910, and a Ph.C. degree from Columbia University in 1911. From pharmacy he went to medicine, and in 1917 obtained his M.D. degree from the Chicago College of Medicine and Surgery (now the Loyola University Medical School).

Medical practice, however, was not Victor Robinson's métier, and it was not long before all else was abandoned for the true calling, the *via sacra* of medical history. The man who thus became a devotee of *Clio medica* was not a complete novice, for he had already written extensively. Biographical accounts of *William Godwin and Mary Wollstonecraft,* and *Comrade Kropotkin* appeared in 1907 and 1908, *An Essay on Hasheesh* was published in 1912, and *Pathfinders in Medicine* made its first appearance in 1912. Thenceforth, Victor Robinson delved deeply and extensively into the history of medicine, and made frequent journeys to Europe to visit the scenes where the protagonists of the medical past had carried on their activities. In the course of these journeys, he photographed objects of medico-historical and archaeological interest in Italy, Greece, and Crete. He was a prolific writer, producing thirteen books, of which the last two, *White Caps: The Story of Nursing,* and *Victory Over Pain. A History of Anesthesia,* appeared in 1946, and editing many others.

But of equal importance with his work as a writer was his work as a teacher. From 1929 to his death, Victor Robinson held the professorship of medical history at Temple University School of Medicine. His influence as a teacher, however, extended far beyond the limits of his formal posi-

tion. Many interested in medical history consulted him on their problems, and to all he gave unsparingly of his time and knowledge. When a group of New Yorkers interested in medical history founded the New York Society for Medical History several years ago, Victor Robinson quite naturally became the first president.

Behind all his activities was a philosophy of life, which can hardly be presented better than in his own words. In *The Story of Medicine* Victor Robinson wrote:

> Life is a great experiment in physiology, in which we all take part: the unknown holds the protocols, and Death writes the conclusions. We do not know where the experiment is tending, nor can we control the outcome. There are gates we cannot open, and impassable roads without a guide-post. Yet we have pressed immeasurably forward; the sable curtain still shrouds us in darkness, but it is no longer so frightening. Often it has lifted, and where once was most impenetrable, are seams through which we steal a glance at the mysteries beyond. We have mounted our present height over the accumulated discoveries of the centuries, but chiefly those of modern times. We linger still on the lower rungs, and the upward climb is uncertain, but never was the way so clear. In the eternal quest, Medicine and Biology are halted by a speck of protoplasm, within whose nucleated cell is locked the mystery of animated matter. With ever new, yet ever insufficient knowledge, we continue the never-to-be ended Journey.

## The Most Important Works of Victor Robinson

William Godwin and Mary. Wollstonecraft (1907)
Comrade Kropotkin (1908)
An Essay on Hasheesh (1912)
Pathfinders in Medicine (1912)
Poems (1913)
Pioneers of Birth Control (1919)
Don Quixote of Psychiatry (1919)
Life of Jacob Henle (1921)
The Story of Medicine (1931)
Syllabus of Medical History (1933)
Way of Life of a Physician (1941)
White Caps: The Story of Nursing (1946)
Victory Over Pain. A History of Anesthesia (1946)

## Publications Edited by Victor Robinson

Symposium on Humanitarians (1908)
Medical Review of Reviews (1916)
Medical Life (1920)
Historia Medicinae (25 vols., 1926)
Modern Home Physician (1934)
Sexual Relations of Mankind — Mantegazza (1935)
Physiology of Love — Mantegazza (1936)
Encyclopaedia Sexualis (1936)
Psychopathia Sexualis — Krafft-Ebing (1939)
New People's Physician (8 vols., 1941)
Morals in Wartime (1943)

Dr. Robinson also contributed articles to Archives of Dermatology and Syphilology; British Journal of Dermatology and Syphilis; Bulletin of the Institute of the History of Medicine; Cyclopedia of Medicine; Dic-

tionary of American History; Max Neuburger Festschrift; Scientific Monthly; The Laryngoscope; and The World Book Encyclopedia.

### Professional Positions and Memberships

Founding Member, History of Science Society (1924)
Council Member, American Association of the History of Medicine (1939–1941)
President, New York Society for Medical History (1940–1941)
Professor of History of Medicine, Temple University School of Medicine (1929–1947)
Lecturer on History of Nursing, Temple University School of Nursing (1937–1947)
Member of the Institute of the Aeronautical Sciences (1943–1947)
Fellow of the New York Academy of Medicine (1943–1947)
Chairman of the Section of Historical and Cultural Medicine, New York Academy of Medicine (1944)

# *Notes and Queries*

*Edited by* MAX H. FISCH*

## *The Mather Bibliographies*

BOOKS OF PERMANENT value are often slow to reach their elected readers, especially if launched on the eve of such far-reaching disruptions of cultural continuity as were occasioned by the war of 1939–1945, or even by the depression of the preceding decade.

The bibliographies of Increase and Cotton Mather by Thomas J. Holmes are recognized by the few who know them as "not far from being the chief monuments of American bibliography" and as classic examples "of the manner and degree in which bibliography may serve the study of history."[1] Yet the first generation that should have used them as keys to the life and thought of colonial New England and as models of bibliographic method, was first cut off from such studies by the depression and then went off to the wars, and since its return has had more urgent business in hand.

One public they have scarcely reached is that of students of the history of medicine and science in America. The purpose of this note is to call them to the attention of that public. For though neither Increase nor Cotton Mather was a scientist in his own right, both were students and popularizers of the scientific thought of the age, both wrote on scientific subjects, and at one point they gave a lasting impetus to medical progress.

Increase Mather published a work on earthquakes and three on comets. He had "often wished that the natural history of New England might be written and published to the world, the rules and method described by that learned and excellent person Robert Boyle Esq. being duly observed therein." His *Essay for the Recording of Illustrious Providences* contains, along with much else, materials for such a work, and is a fair if not a shining example of the popular science of the day. He believed in witchcraft, but thought it "better that ten suspected witches should escape than that one innocent person should be condemned," and Mr.

* Professor of Philosophy, University of Illinois.

[1] Thomas James Holmes. *Increase Mather, a Bibliography of His Works* with an introduction by George Parker Winship and supplementary material by Kenneth Ballard Murdock and George Francis Dow, 2 vols. Cleveland, Ohio, 1931. (Agent: Harvard University Press. Reviewed by Leonard L. Mackall in *New York Herald Tribune Books*, Dec. 18, 1932, p. 18; and by Samuel E. Morison in *New England Quarterly* 6 [1933] 838-40).

T. J. Holmes. *Cotton Mather, a Bibliography of His Works*, 3 vols., Harvard University Press, Cambridge, Mass., 1940. (Reviewed by Lawrence C. Wroth in *New York Herald Tribune Books*, Oct. 6, 1940, p. 33; and by Elizabeth L. Adams in *More Books* 16 [1941] 146-51. The quoted phrases are from the former review.)

See also the following supplementary volume, not here considered: T. J. Holmes, *The Minor Mathers, a List of Their Works*. Harvard University Press, Cambridge, Mass., 1940. (Reviewed by Lawrence C. Wroth in *New York Herald Tribune Books*, Dec. 1, 1940, p. 45. Out of print.)

Holmes shows that it was through his influence that the Salem trials and executions were stopped.

Cotton Mather's second publication was an almanac for 1683. In later life he was elected a fellow of the Royal Society and transmitted to it several instalments of *Curiosa Americana,* some of which were excerpted in the *Philosophical Transactions.* His *Christian Philosopher* is the best index to the state of scientific knowledge in New England at the end of the first quarter of the eighteenth century. His *Thoughts for the Day of Rain* reviews the scientific theories of the rainbow before proceeding to "more theological and agreeable contemplations." To candidates for the ministry he commended "as thorough an insight as you can get into the principles of our perpetual dictator, the incomparable Sir Isaac Newton." "Be sure, the experimental philosophy is that in which alone your mind can be at all established." In early life he too believed in witchcraft; his own method for dealing with it was treating the victims in his home and recording their case histories, but he did not share his father's opposition to the trials.

In his youth Cotton Mather suffered from an impediment of speech which seemed to disqualify him for the ministry, so he studied medicine and imagined he had "every distemper." Having overcome the impediment, in his first sermon "because of the calling he had relinquished he did . . . consider our blessed savior as the glorious physician of souls, choosing those words for his first text in Luke IV 18, 'He hath sent me to heal the broken-hearted.' "

In his own more literary way, he exemplified that "angelic conjunction" of the offices of pastor and physician which he praised in preachers who practiced medicine in communities without the services of resident doctors. He wrote a "Family Physician" which survives in manuscr[illegible] of which he published only a small part under the title *The Angel of Bet[illegible]a,* expounding a theory of the psychic causation of bodily disease. He published *A letter about a good management under the distemper of the measles, at this time spreading in the country; here published for the benefit of the poor, and such as may want the help of able physicians.* In a time of sickness he published his *Raphael: The Blessings of an Healed Soul Considered* and noted in his diary: "I would commit some numbers of my *Raphael's* into the hands of pious physicians entreating them to bestow them upon their patients, as they find them to recover of their maladies: that so corporal and spiritual healings may go together."

More even than most ministers of the time, the Mathers, and especially Cotton, used the language of medicine in discoursing of spiritual health and sickness. A striking example of the homiletic use of medical allusion is Cotton Mather's paraphrase of the familiar twelfth chapter of *Ecclesiastes,* into which he has woven Harvey's doctrine of the circulation.

Except perhaps for the witchcraft episode, there was little in all this that was original or creative; the Mathers were for the most part adapters and transmitters. They did, however, make a signal contribution to the advance of medicine by courageously promoting inoculation for smallpox. Mr. Holmes has done full

justice to what they wrote and did in this connection, and his notes can be read with profit even by those who are familiar with Kittredge's essays.

Many readers of Dr. Henry R. Viets's admirable *Brief History of Medicine in Massachusetts* must have wished for a much fuller account of the colonial period than the scale of his book permitted him to give; and some of them must have considered attempting to provide it. Anyone who embarks on such an enterprise would be well advised to start with Mr. Holmes's bibliographies of the Mathers. Between their covers is much of the material he will need, along with pointers to most of the rest. To students of the history of medicine and of science generally, regardless of place or period, they may be commended without reservation as models of bibliographic method.

The entries are printed in the alphabetic order of the titles, but each bibliography is preceded by a chronological list, by the aid of which it may be read as a bio-bibliography. When they are so read, Mr. Holmes's accounts of the circumstances under which the books and pamphlets were composed and published, his summaries and interpretations, and above all his extensive quotations, give the reader a sense of intimate participation in the life of the times such as is conveyed by few histories, documentary collections, or even biographies.

Before entering upon his second career as a bibliographer, Mr. Holmes had behind him a distinguished career as a hand-binder of fine books. It is not surprising, therefore, that among the many distinctions of his bibliographies is the wealth of information they provide about book production, printing, and binding in New England in the late seventeenth and early eighteenth centuries. Their most striking feature, however, is the reproduction by photo-zinc etching of the title-pages of all first editions (more than six hundred) and of some second editions, and also of the tables of contents and other interesting pages of some items. By the use of color filters to stop out the stains of time, these pages have been restored to the freshness with which they left the original printers' hands.

Early in his bibliographic studies the author was admonished by Worthington C. Ford: "Mr. Holmes, you are getting into that Mather bog. I warn you, you will never get out of it again." He struggled manfully through, however, and came out triumphantly on the hither side. In his latter years, he has returned to his first career, but this time in an advisory capacity. As Honorary Consultant to the Army Medical Library, he has been an invaluable guide in the program of repair and restoration of its rare book collections which is still proceeding at its Cleveland Branch.

MAX H. FISCH

## *Edward Cutbush*

IN HER VALUABLE article on "Government and Science in the United States," *Journal of the History of Medicine and Allied Sciences* 1 (1946) 256, Miss Madge Pickard says of one of her main heroes, Edward Cutbush, "very little is known of him," and seems unable to give the date of Cutbush's death (1843). Fortunately things are not as bad as that. The fact that Cutbush was one of our outstanding naval surgeons has saved him from oblivion. He introduced vaccination and the use of lemon juice in the Navy and published in 1808 the first

American book on naval hygiene. See my article on "The Care of the Sick and Wounded Sailor in the United States," *Ciba Symposia* 4 (1942–43) 1411 ff. In my "Bibliography of Naval Medicine," *ibid.* 5 (1943) 1520, I list a rather detailed study of F. L. Pleadwell on Cutbush in the *Annals of Medical History* n. s. 5 (1923) 337; L. A. Roddis, *Short History of Nautical Medicine* (1941) contains valuable data; and Kelly-Burrage's *Dictionary of American Medical Biography* (1928) also carries (pp. 281-82) a detailed note on Cutbush.

ERWIN H. ACKERKNECHT

## *Luiz de Mercado*

DR. M. NIERENSTEIN, professor emeritus of chemistry at the University of Bristol, died on January 24th, 1946 at the age of sixty-eight. He was one of the outstanding authorities in the chemistry of tannins, and his book on *The Natural Organic Tannins* (London 1934) has been regarded as a classic in the field. In this book the history of tannins has been given an unusual amount of study and space. Two years earlier, in 1932, Nierenstein had published his excellent *Incunabula of Tannin Chemistry,* "a collection of some early papers on the chemistry of the tannins reproduced in facsimile and published with annotations." Numerous essays pertaining to the history of medicine and pharmacy (the author had studied medicine before turning to the study of organic chemistry) appeared in various journals, and as late as Christmas 1945 Nierenstein wrote the undersigned about his intention "one day to publish a collection." The essay published here was found on the desk of the deceased and sent by his widow to the undersigned.

GEORGE URDANG

Little is known of Luiz de Mercado who, in his medical writings, used the latinized form of his name, namely, Ludovicus Mercatus, Spain's foremost physician of the 16th Century, and who was the first to devote much study to the then new disease diphtheria or *garrotillo,* later on frequently confused with influenza.[1] His biographers are generally agreed that he was born in 1520 at Valladolid, where he studied Medicine at that University, and finally became the Senior Professor of Medicine until he accepted the appointment as Court Physician to Philip II and on the death of the latter, to Philip III. There is however, uncertainty as regards the year of his death which is given as either 1600 or 1606.[2] It was therefore a fortunate meeting when I met some years ago Dr. Alphonso de Mercado, who put at my disposal his knowledge of the life and character of his famous ancestor.

Luiz de Mercado was the grandson of a well known surgeon in Cadiz who also

[1] Kleineberg, *Quod influenze est?* (Heidelberg 1787); Zech, *De morbo Estoniae endemico* (St. Petersburg 1797); Raffour, *La Médecine chez les Mexicains précolombiens* (Paris 1900) is of the opinion that diphtheria originated in Mexico, where it was introduced by the Acolhuaños Indians early in the thirteenth century.

[2] Morejon, *Historia bibliographica de la medicina española,* 7 vols. (Madrid 1842–52); Hirsch, *Biographisches Lexikon der hervorragenden Aerzte,* 6 vols. (Wien and Leipzig 1884–88); Gurlt, *Geschichte der Chirurgie,* 3 vols. (Berlin 1898).

was called Luiz. This Luiz the Elder had two sons called Pedro, the elder having died at the age of 17 before his brother Pedro was born. There was also a daughter but nothing is known of her. Pedro studied medicine in Cadiz and settled down in general practice at Valladolid, where, as already mentioned, the famous Luiz was born. At the age of 30 Luiz married Juana de Veiga, the daughter of a Madrid surgeon, and they had three sons and two daughters and again nothing is known of the two girls. Of the three boys both Pedro and Juan studied medicine at Valladolid. However, Pedro went to Italy to continue his postgraduate studies, where he finally remained for good and in due course italicized his name into Mercato, whereas Juan settled down as a surgeon in Madrid. The third son, whose Christian name is not even known, emigrated to South America.[3]

Dr. Alphonso de Mercado, whose father was a farmer, started his medical studies at the University of Carácas but left for Europe where he qualified and took his M.D. at Paris. Before returning to Venezuela he visited Valladolid and recovered the case books and some of the books read, as well as those written, by his famous ancestor. I found the books read by Luiz de Mercado of special interest, as they show the kind of works read at that time by the medical profession. The following are some of the works the late de Mercado used for reference:

(1) Fragosa,[4] *Erotemas quirurgicos,* Madrid, 1576, and *De la ciruja de las evacuaciones y antidotaria,* Madrid, 1581; (2) de Benavides,[5] *Secretos de Chirurgia,*[6] Valladolid, 1567; (3) de Vega,[7] *Opera omnia,* Madrid, 1597; (4) Carnicer,[8] *Glosasas de la ciruja,* Madrid, 1597; (5) Mondino de Liucci,[9] *Anatome omnium humani corporis interiorum membrorum,* Valladolid, 1557; Cordus,[10] *Dispensatorium Pharmacopolorum,* Madrid, 1557.

Before Luiz de Mercado entered the service of Philip II, he used to visit daily the three hospitals to which he referred as the *Xenodochium Generale, Xenodochium Speciale,* and *Xenodochium X.* Judging from his case-books the latter was the lunatic asylum, a part of which he reserved for the study of new diseases such as diphtheria and the like. (The name Xenodochium for hospital is very old,

[3] My host was a direct descendant of this unknown Mercado.

[4] Nothing is known about the life of Fragosa, except that he preceded de Mercado for a short time as Court Physician to Philip II.

[5] De Benavides lived in the sixteenth century and was a Physician at the General Hospital of Mejico in Spain. He specialized in diseases of the throat and the surgery of the esophagus.

[6] Although a work on surgery, the *Secretos de Chirurgia* is mainly devoted to *morbus gallicus.*

[7] De Vega (1510–73) was the physician of the unfortunate Infante Don Carlos.

[8] Carnicer lived at the end of the fifteenth century, and was in general practice at Saragossa; he is known for his Spanish translation of Avinon's *De flebotomia* (Saragosa 1533).

[9] Mondino de Liucci (1275–1327) who has frequently been confused with his contemporary, Mondino of Friol, wrote one of the earliest works on anatomy, which survived de Liucci for several centuries. His anatomy contained a great deal of original work on the hymen, the uterus, the vulva, and the heart. As an old University teacher I have often wondered why those who write on the importance of Liucci to the history of anatomy always quote his observation on the hymen, "velamen subtile quod inviolatis rumpitur," and rarely mention what Liucci's students thought of him: "Mundinus quem omnis studentium universitas colit ut Deum."

[10] Nierenstein, *Pharm. Jour.* 155(1945) 116.

it was originally used by the Roman Senator Pammachius[11] and later revived by Belisarius,[12] who founded a Xenodochium in the *Via Lata* at Rome.) De Mercado taught at these hospitals when he was professor of medicine. Even his private patients, who had some interesting disease, had, for the benefit of the students, to enter one of these hospitals, for Mercado was foremost a teacher and not a general practitioner.

When de Mercado went to live in the Palace and later on in 1567 to the Escurial, he gave up his general practice but continued his work at the three hospitals. He used to leave his rooms at the Imperial Headquarters soon after 4 A.M. and spend from 5 to 7 A.M. at the Xenodochium Generale and from 8 to 10 A.M. at the Xenodochium Speciale, and was back at the palace to attend to the Imperial Family at 11 A.M. Later he attended to the members of the Court who, however, had to see him at his Surgery. It is noteworthy that he kept no records of the complaints of his patients at the palace, although otherwise he kept careful notes. Late in the afternoon he visited Xenodochium X and if time permitted paid short visits to the other two hospitals. From a draft letter, probably addressed to Philip III, found by Dr. Alphonso de Mercado, it is evident that these long absences were frowned at both by Philip II and Philip III and that de Mercado offered his resignation to both of them.

Luiz de Mercado has left 13 medical works which were collected before his death in his *Opera omnia,* Vallesoleti, 1605, and reprinted many times in Spain, Italy, Germany, and Holland. With the exception of the Dutch edition, they are listed by Gurlt.[13] Dr. Alphonso de Mercado had all the works in his library, with the addition of the *Opera omnia,* Mexico, 1717 (not listed by Gurlt), which I have used.

As already mentioned, de Mercado is known as the discoverer of diphtheria or, as it was colloquially known, *garrotillo,*[14] and he seemed to have looked upon it at one time as a special form of insanity. He was strongly opposed to trepanning in cases of insanity, still in vogue at that time, and for some time he looked upon *morbus incognitus,* as he called diphtheria, as a special form of insanity. Thus he states:

> On one occasion when some of the lunatics contracted this new disease, the results were astonishing; in fact it seemed to benefit them. Their eyes became clear, their speech intelligible and their general behavior more or less normal. Out of four cases one man seemed entirely cured and after four months' observation the Emperor agreed to have him discharged. I visited this man for two years at his home nearly every month, and found no reason to regret his discharge. It seems as if the lesser disease had cured the severer one, but I am unable to account for it.

Later on when he had a large number of paralytics, lunatics, and cases of *morbus gallicus* especially in the throat, he began to connect the two diseases and came to the conclusion that they are one and the same disease of different viru-

[11] Walsh, *Medieval Medicine* (London 1920).

[12] For the history of Belisarius (505-565) and his influence on military medicine see Bury, *The Later Roman Empire* (London 1889).

[13] Gurlt, *Geschichte der Chirurgie* (Berlin 1898) 3. 403.

[14] The obvious origin of *garrotillo* is *garrotir,* "to strangle," but Dr. Alphonso de Mercado was of the opinion that it is far more likely derived from *garruleria,* "to babble."

lence. Things, however, became still more complicated when mercenaries arrived from Russia, especially Esthonia, who introduced the blue smallpox, and de Mercado writes in despair: "Spain has become the home of all that is evil in Europe, yes in the whole world and *morbus incognitus* is still an unsolved problem. May God lead me in my search to find the answer to this vexed question so as to help humanity in its sufferings." However, 16 years before he died, he was able to sort out the material he had collected[15] and named his *morbus incognitus* diphtheria, which he derived from the Greek *diphtheria* (leather), so as to indicate the leathery appearance of the throat. The discovery of diphtheria as a separate disease dates back to either 1590 or 1584 depending on whether Luiz de Mercado died in 1606 or 1600, and it took de Mercado nearly 50 years to clear up this vexed question. In surgery he ventured to undertake only minor operations. He even avoided operating on ruptures and preferred massaging, rupture belts, and other forms of support. Whenever necessary he used to call in surgeons of standing, such as de Aguero, de Molina, and others, and it is noteworthy that the name Fragosa does not appear in his case-books. To judge from his notes, he disliked the famous surgeon Fragosa, who preceded him as Court Physician to Philip II.

M. NIERENSTEIN

### *Dr. Ackerknecht's Appointment as Professor of Medical History at Wisconsin*

Dr. Erwin H. Ackerknecht, a member of the Board of Editors of the JOURNAL, has been appointed to the new professorship in the History of Medicine at the University of Wisconsin School of Medicine. Dr. Ackerknecht has been working in the field of medical history since 1928; he received the degree of Doctor of Medicine at the University of Leipzig in 1931, with a medico-historical thesis written under the direction of Dr. Henry E. Sigerist. From 1933 to 1941 he lived in France, where he studied anthropology. He served with the French Army before coming to this country in 1941 as a research fellow at the Institute of the History of Medicine of the Johns Hopkins University. He has been Assistant Curator of Physical Anthropology at the American Museum of Natural History for the past two years. Dr. Ackerknecht's chief interest has been in the study of primitive medicine, and he has written many important articles on that subject as well as on the history of medicine generally. He is the author of *Beiträge zur Geschichte der Medizinalreform 1848* and *Malaria in the Upper Mississippi Valley 1760–1900.*

### *Physicians Art Association*

The $34,000 prize contest for physicians' art work on the subject of "Courage and Devotion Beyond the Call of Duty" will be judged at the Atlantic City Cen-

[15] Dr. Alphonso de Mercado has counted the number of cases of *morbus incognitus* studied by his famous ancestor and gave me the total as 11,673.

tennial Session of the A.M.A. at Atlantic City June 9-13, 1947. The closing date is May 15, 1947.

Art works on other subjects may also be submitted for the regular cups and medals.

For full information, write Dr. F. H. Redewill, Secretary, American Physicians Art Association, Flood Building, San Francisco, Calif., or to the sponsor, Mead Johnson & Company, Evansville 21, Ind., U.S.A.

### *Library of Congress*

The Library of Congress marked the centennial of the Smithsonian Institution with an exhibit of early documents and prints from the collections of the Library which relate to the Smithsonian Institution's early history.

An exhibit of books, prints, and manuscripts on the development of anesthesia was given by the Library of Congress and the Army Medical Library to commemorate the centennial of the first public demonstration of ether anesthesia.

Both exhibits closed on November 30, 1946.

This number of the JOURNAL was delayed because of printing difficulties. Beginning with this issue the JOURNAL will be printed in New York to facilitate its prompt publication.

# *Book Reviews*

VICTOR ROBINSON. *Victory over Pain. A History of Anesthesia.* New York: Henry Schuman, 1946. xiv+338 pp., illustrated. $3.50.

HERE is a book which belongs in the library of every medical man, but also in the library of every person to whom life is more than mere living. For the victory over pain is mankind's victory, is the victory of every human being over his grim and ancient enemy. And this book is written in a readable style which cannot fail to appeal to every lover of good literature and to every person who interests himself in the evolution of civilization.

"*Victory over Pain* is the first volume in the *Life of Science Library* . . . . These books are intended to provide, in an authoritative and readable manner, *the historical backgrounds of the scientific advances that dominate contemporary living,* and thus by illuminating the past contribute to an understanding of the present."

The italics in the quotation are mine. An immense quantity of time and labor has been expended upon the history of medicine, and most of it has been wasted through the lack of historical technique. The professional historian has criticized the amateur attempts of the historians of medicine with much severity on this ground, and it must be confessed that the criticism, in general, has not been unjust. Our histories of medicine, and our histories of parts of medicine, are largely annalistic or biographical; but a collection of facts or a series of biographies does not constitute history. We have lacked the analytic and perspicuous eye, and the discriminating and synthetic understanding, of the true historian—the present reviewer keeps discreetly silent about literary style.

In 1925, Noël Hallé, of Paris, in his *Eléments de philosophie médicale,* attempted to construct a "synthèse philosophique de l'histoire de la médecine." Admittedly brief and provisional, this work none the less pointed the way in which the development of the history of medicine must go if it is ever to mature and merit the name and the dignity of history.

For all the fine things that may be said, and said with justice, about Dr. Robinson's *Victory over Pain,* it is the opinion of the present reviewer that the greatest single excellence of the work is precisely its historical quality. To collect all of the facts assembled in this volume involves no more than an expenditure of time, an exercise of great patience, the spending of money, the acquisition and careful consultation of authoritative sources — no trifling considerations in themselves, assuredly, but considerations which others also might have been found willing to abide. But it is a rare accomplishment indeed to have made a synthesis of the evolution of anesthesia and to have set it so well against the background of the lives and the times and the circumstances. In the chapters concerned with

the great discovery itself, one lives in the roaring middle third of America's nineteenth century. One sees how the discovery and development of anesthesia were things inseparable from the lusty and pioneering spirit of America itself in those decades. One knows that the discovery and development, and even the controversies for priority of claim to honor, were events that simply could not have not happened. This historic fact was as inevitable as the dénouement of a perfectly constructed Greek tragedy.

This is not mere fulsome praise. The work might conceivably have been done better, although this critic himself could not have done it as well as by far. The fact which remains is the fact that Dr. Robinson has created an organic and a living thing, not merely recorded a collection of facts. This is one of the elements which makes the book so eminently readable. The author has written history, not annals or a set of biographies. It goes without saying that he has written it objectively: where bias, feeling, sentiment, and opinion are aired, there is no history, but only autobiography.

It is a matter of regret that Dr. Robinson's untimely death has removed one who was so capable of enlightening the minds of aspiring historians of medicine (and how desperately we need them!) with his presentation of facts, surely, but ever so much more by his disclosure of what history is. It is hoped that the publisher of *Victory over Pain* will be encouraged in every way possible to continue to enable such works to be brought to light, by judicious choice, by scholarly criticism of manuscripts submitted, and by dignified publication of nothing but the best that can be had. In the hope of having more books like this to grace his library, the present reviewer and collector of fine editions thanks the publisher for handsome design, legible type, good paper, and especially for numerous illustrations.

Marquette University School of Medicine

G. KASTEN TALLMADGE

SIR CHARLES SHERRINGTON, *The Endeavour of Jean Fernel with a List of the Editions of his Writings.* Cambridge, at the University Press, 1946. x+223 pp. $3.50.

THE late Mr. Robert Bridges, Poet Laureate of England, published *The Testament of Beauty,* undoubtedly his greatest literary contribution, when he was 86. Mr. George Bernard Shaw, who won a Nobel prize at 70, has remained vocal well into his 80's. Voltaire had recently completed a play and was in the midst of another when he died at 84. But surpassing all these, Sir Charles Sherrington, now in his 89th year, has just given us his most outstanding literary piece — a fitting culmination to more than sixty years of productive scholarship.

*The Endeavour of Jean Fernel,* which follows on the heels of *Man on his Nature* (1943), is a penetrating biography of a Renaissance scholar-physician who has been described as "the symbol of 'modern man.'" To a searching analysis of Fernel as a man, Sir Charles has added an exhaustive list of editions of Fernel's

many writings, in the compilation of which he sets an enviable example of discriminating bibliographical detail. He has also included a census of all copies of each edition that he has been able to trace. Few attempts to list the works of a writer whose books are for the most part obscure and difficult to locate have been completed with greater thoroughness.

Fernel began his career as a physician at a time when the liberal influence exerted by the humanists at Lyon and Paris — Rabelais, Champier, and Dolet — was opening new vistas in French medicine and French scientific thought. Fernel was 33 when he took his license to practice medicine, but his interest both before this date and for a time thereafter lay in mathematics. His first book, the *Monalosphaerium,* published in 1527, was issued by the greatest contemporary printer of Paris, Simon de Colines, in a sumptuous format, which fact would seem to indicate that Fernel was held by de Colines as a man of exceptional promise. The book was purely mathematical, describing an astrolabe of his own devising which facilitated the measuring of time. His second book, the *Cosmotheoria,* which appeared a year later, dealt with the shape and size of the earth. Yet a third treatise, *De proportionibus,* dealing with the use and theory of fractions, was also issued in 1528.

Fernel soon turned his keen critical sense to medical practice and to the history of physiological and medical theory. Following a rigorous régime of work and study, adhered to throughout his life, he arose at four in the morning and began his lectures at 5:00 a.m., as was the custom in Paris at that time. He ate sparingly at lunch and dined early so that he might have a long evening for reading and writing. The results of this strict application to work soon resulted (1542) in a notable volume entitled *De naturali parte medicinae,* also issued from the press of Simon de Colines. This book, published just a year before Vesalius brought out his celebrated *Fabrica,* is regarded by Sherrington as the earliest general text in physiology; a few years later, in a new edition of the book, Fernel himself designated it *Physiologia,* thus introducing the name by which the subject has been known ever since. His reason for writing the *Physiologia* is reported as follows: "Some when they have 'done' anatomy and 'done' their philosophy straightway practise the art of healing, but that is to rush into a darkness which their eyes will never pierce. Physiology tells the causes of the actions of the body."

Sir Charles maintains that Fernel was far ahead of Vesalius in his thinking — "Fernel's view of the body . . . is not a merely static one like that of Vesalius — just a gross shape in frozen time. The living body is expounded by Fernel as a dynamism, but it is a spirit-dynamism — so spiritist that it leaves little or nothing for chemistry and physics to do. Today physiology *is* chemistry and physics." Sherrington adds:

> In treating of our muscular movements, and their relation to our thinking, Fernel makes in passing a notable remark, not met with in the customary handling of the subject. It is that some of our acts occur quite apart from "appetition" and "will." Some movements of the eyes and eyelids, and of the head, and also of the hands during sleep, and again our movements of breathing, do not proceed, he says, from intent or any other impulse of the

category of active muscular movement independent of will, or other intention-pure "motricity" acting of itself. Fernel does not elaborate this further. But in the following century, whether unaware of Fernel's remark or not, Descartes returned to similar observations, and dealt with them in a manner which caught the abiding attention of the world.

In the acute perception of Fernel's observation we find the man who earlier wrote in his "Dialogue":

> Many tell us that the art of healing, discovered by the labours of our forefathers, and brought to completion by dint of Reason, has now attained its goal. They would have us, who come after, tread in the same footsteps as did the Past. It were a crime, they tell us, to swerve a hair's breadth from the well-established way. But what if our elders, and those who preceded them, had followed simply the same path as did those before them? . . . Nay, on the contrary it seems good for philosophers to move to fresh ways and systems; good for them to allow neither the voice of the detractor, nor the weight of ancient culture, nor the fullness of authority, to deter those who would declare their own views. In that way each age produces its own crop of new authors and new arts. This age of ours sees art and science gloriously re-risen, after twelve centuries of swoon. Art and science now equal their ancient splendour, or surpass it. This age need not, in any respect, despise itself, and sigh for the knowledge of the ancients . . . .

Here speaks the Renaissance, and the man whom Sir Charles calls "one of the relatively few who as they enter advanced years grow more modern."

From 1542 until his death in 1558, Fernel's fame increased. He was popular with students who found him a voice with a new message. He was likewise popular with patients and in 1542 was appointed physician to the Dauphin, later (1556–57) physician to the King, which post he had declined in 1547, when Henri II became king, so that he might devote more time to study. But Fernel was not popular with all of his fellow physicians. He renounced astrology as an adjunct to medicine, he had no faith in "natural magic" and rejected the "philosopher's stone" as fable, he strongly advocated moderation in blood-letting. These theories, so far ahead of the thinking and practice of the time, could not fail to arouse controversy. But opposition did not halt Fernel for a moment. In 1554 he published his "Pathology," probably his best known work. Sir Charles comments: "The 'Pathology' in several ways broke new ground. Not merely was the name new, but, as treated, the subject was new . . . . It was a systematic essay on morbidity, pursued unhaltingly through the body, organ by organ. Fernel is today sometimes mentioned as the 'father of Pathology.'" Notable among his other works were his treatises on therapeutics and contagion.

Sir Charles concludes his evaluation of Fernel and his contributions to philosophy and medicine with a comparison of Fernel with his contemporaries and with those who followed in his line of thinking, such as Descartes and Harvey. The final paragraph, with its keen and dispassionate judgment, its wisdom and sympathy, should be a *vade mecum* of all biographers:

> And so we take our leave of Jean Fernel. His days were taxed, year in year out, to meet an overwhelming professional practice, and he gave himself to its cares and its exacting routine in no unwilling spirit. But, through all, he was one who never let himself forget that the sick man lay against the great background of living things in general, and the stars and a Deity beyond the stars. He was also one who, amid an age of furious currents of

opinion, never relaxed his effort to read Nature without fear or favour, and judge what may be the rightful grounds of the dignity of man. It seems worth while, across the centuries, to seek contact with such a one, and, as we do so, the temptation is perhaps to pick out, in the light of today's knowledge, what has proved right in his outlook, and to exalt it, that its worth may shine the brighter. But there, I think, he would have been the first to smile and say, "if you value me, do me the favour to render me all in all for what I was. I was right earlier than my time in some things; I was compact of mistakes too. If I live, let me live in the round and altogether."

Yale University School of Medicine

JOHN F. FULTON

EDWARD STIEGLITZ. *A Future for Preventive Medicine.* New York: The Commonwealth Fund, 1945. xvi+77 pp. $1.00.

IN TITLING his book "A Future for Preventive Medicine," Dr. Stieglitz carefully points out that he is not attempting to forecast the direction in which preventive medicine will develop in coming years, but is attempting to discuss at least one aspect in which development is not only likely but is also highly important. This direction he defines as "constructive medicine" which will concern itself with the maintenance of maximum physical vigor of the adult and will consequently effect a reduction in the toll of disability and premature death from the degenerative diseases.

After two preliminary chapters in which consideration is given to the author's philosophy of the scope of preventive medicine and public health, and a brief review of achievement of the past forty years, Dr. Stieglitz develops the familiar theme that the shifting of the age distribution of the population necessitates the development of an active program for control of the degenerative diseases. As he believes that "en masse" techniques used in the control of other diseases cannot be applied in geriatrics, he builds a strong case for "constructive medicine" through periodic physical examinations. He stresses the point, however, that these examinations cannot be mere superficial physical appraisals, but must rather be what he chooses to call complete "health inventories." Such inventories would include not only a thorough physical study of the individual but also analysis of "the probable effects of his previous life upon the physical organism, . . . prompt correction of physical defects, . . . advice and guidance regarding habits of life, . . . and . . . personally applied education in hygiene." Dr. Stieglitz emphasizes not only the diagnostic and corrective aspects of such a program, but lays particular stress on the responsibilities of the physician to be a teacher of personal health. "Physicians everywhere must cease shirking their educational responsibilities."

Dr. Stieglitz's theme is not new, as he himself points out. Medical and public health leaders have attempted for many years to popularize the idea of periodic health inventories and as careful appraisals of health during the declining years of life as during the period of growth. The chief obstacle to this program has been a lack of interest on the part of the public and the medical profession alike, leading to the performance of such superficial examinations that the idea of a periodic physical examination has fallen into undeserved disrepute. The author

recognizes this and points out that thoroughness is essential if the procedure is to be more than a gesture.

In preparing this volume for the Studies of the New York Academy of Medicine Committee on Medicine and the Changing Order, Dr. Stieglitz has produced a worthwhile and stimulating book even though it contains nothing new. It is unfortunate that in doing so he has permitted so many inaccurate statements to creep into the manuscript, statements apparently based on inadequate familiarity with the public health program and its evolution. He commits the common error of claiming for the medical profession responsibility for the improvement of health during the past forty years, ignoring the contribution of the engineers, chemists, bacteriologists, sanitarians, and social workers, who may well claim major credit for those accomplishments. In portraying the public health official as incapable of developing new programs that depart from the pattern of control of infection, he overlooks the development and achievements of the child hygiene program, many parts of which have been bitterly opposed by the medical profession. He likewise ignores the fact that health officers have repeatedly attempted to develop programs in geriatrics that are built on the concept of service to the individual, but that the chief opposition has been the cry of interference with the private practice of medicine. The reader will find many such statements that are inaccurate in either fact or implication. These are unfortunate for they leave the impression that the author is out of touch and sympathy with current public health programs and fails to see the possibility of closer coordination between the community program and the program of "constructive medicine" that must be carried by the individual physician. If the reader will overlook these inaccuracies, he will find in Dr. Stieglitz's monograph a worthwhile plea for a well performed and careful supervison of all phases of adult personal health.

University of Minnesota Medical School

GAYLORD W. ANDERSON

EDWARD H. HUME. *Doctors East, Doctors West.* New York: W. W. Norton, 1946. 278 pp., illustrated. $3.00.

DR. HUME was born in India where his father and grandfather had worked for many years as principal of a high school and as a missionary. From his father he received sound training in Latin and Greek, and was well prepared when he entered college in the United States. After studying medicine at Johns Hopkins, he returned to India and started to practice medicine as the only American physician in Bombay. Despite his strong ties with India's sacred soil, he decided in 1905 to leave the country where he was born and to migrate to China. Anybody who knows Hume will be convinced that potent spiritual reasons must have been the motive for this important change of abode. As a matter of fact, it was only the alluring thought that ultimately a University Medical College under Christian auspices might be launched in the center of China which enticed him to attempt the introduction of modern medicine in the province of Hunan. This province

is the rice bowl of China where rice can be harvested at least twice, often three times, a year. The treaty which opened Hunan province to the foreigners was wrested by the Western powers from the Manchu diplomats in Peking. At the time, however, the memories of the Boxer insurrection were still vivid in the province, and the inhabitants of Hunan had no sympathy for Westerners. The stone gateway, which on the highway along the Yangtze River marked the entrance to Hunan, was blocked with stones, bricks, and lime as a symbol that the Hunanese did not wish any foreigner to enter their province.

When Hume at last reached Changsha, the capitol of Hunan on the Yangtze River, the Chinese mothers still pushed their little children behind them when a foreigner passed in order to protect them from the evil eye. Other Chinese held their noses when a foreigner came near as a protection against the disagreeable smell by which the sensitive nose of the Chinese recognized the butter-eating Westerner. Children shouted "foreign devil" as soon as they spied a sedan chair which carried a Westerner. In these anti-foreign surroundings Hume was pledged to open a Junior College and to organize a Dispensary. It took some time before he found occasion to purchase the necessary property. The City fathers had forbidden the sale of property to foreigners. Fortunately, a Chinese friend was willing to act as a "dummy" and purchase the houses in his own name. Under such circumstances, it is evident that Hume had to overcome many difficulties and obstacles before he could even start to think of gaining the confidence of the Chinese. In his book Hume does not conceal how many mistakes he, the barbarian physician from the West, inadvertently made against Chinese etiquette. When a Chinese physician examines a patient he must feel both pulses — in a male patient first the left one and then the right one, in a female patient first the right one and then the left one. The condition of the left pulse reveals the condition of heart, liver, and kidneys; the right pulse permits judgment about diseases in the lungs, spleen, and genital organs. When Hume started his examination of an important Mandarin by careful palpation of the left pulse, he was first complimented for his correct approach. When, however, he then did not investigate the conditon of the right pulse, but in customary Hopkins style proceeded to take the body temperature, the patient left his office indignantly. Hume was blamed severely as grossly negligent and ignorant. He had skipped palpation of the right pulse and thus could have no opinion about the condition of certain vitally important organs. Hume had to pass through many comparable humiliating experiences before he dared to undertake to admit patients and transform his modest dispensary into a small hospital. In the beginning the patients were always removed from the Hospital by the family members after the disease had lasted longer than two days because if, after forty-eight hours no improvement had set in, they lost confidence. For two years Hume was careful that no death took place in his small hospital. As soon as the condition of a patient became desperate, he urged the family members to take their relative home because, as everywhere else in China, he had to be careful "that the family members did not blame the physician." He had to compete with the soothsayers, the astrologists, and the physiognomists who were

greatly respected as healers by the Chinese population. Finally, thanks to operations for harelip and cataract, to the opening of many abscesses, and to the successful performance of simple plastic operations, he had gained so much confidence that at last he ventured to undertake the operation of a practically hopeless case. As was to be foreseen the patient died, but the diplomatic advice of his Chinese teacher and counselor prevented a major disaster. The Hospital bought a wonderful coffin for the deceased boy—an efficient way to prevent the family members from blaming the Hospital. On the contrary, the family paid an official visit to the foreign doctor to thank him. The coffin was far more costly than the father, a poor farmer, could ever have afforded, and to provide a splendid funeral for a deceased son gives great "face" to the father in China. This gain of prestige was more than sufficient to counterbalance the grief that the boy had died in a foreign hospital. And this grief is deep because if a patient dies outside the home, there can be no reunion of his spirit with the spirits of the family. This diplomatic victory had a lasting effect and from then on Hume dared to allow the mortality rate of the hospital to rise slowly.

In 1910 the tottering Manchu Government tried to restore its waning power by turning the enmity of the Chinese away from the authorities in Peking by arousing the masses against all Westerners. In Changsha anti-foreign riots broke out and the attitude of the mob became so dangerous that even the reputation of the foreign doctor was no longer protection. Like practically every foreigner who has lived for many years in China, Hume had to go through the bitterness of an ignominious flight from the Chinese whom he had honestly tried to help and protect. During the night he had to leave his house with his family through a secret doorway in the back. Fortunately, they were hidden temporarily by Chinese friends and the next day a friendly Chinese general sent one hundred soldiers to escort the Americans to safety, that is, to a British ship anchored in the middle of the Yangtze. The unrest in Changsha soon settled and after a short time Hume was again at work in his Hospital.

Hume was privileged to see the new dawn appear over China. In 1911 on October 10 (Double Ten) the Revolution broke over China and the great reformer Sun Yat Sen became the leader of the Chinese nation. The Manchu Dynasty was removed and the queues, the sign of allegiance to the Manchus, were abolished. Women were forbidden to mutilate their feet by binding and the new Government looked with sympathy upon progressive public health programs. These fundamental changes were not realized without disturbances, but as Confucius said "he who sees what is right and fails to do so is without courage."

Five years later the realization of Hume's dream came true. American benefactors, leaders of the Yale University Mission, made it possible for a genuine Medical School to be built in Changsha. This new medical college was designated as the Hsiangya School or "Yale in China." In 1915 Dr. Welch and Dr. Simon Flexner traveled to Hunan to lay the cornerstone of the new buildings.

The first years of this modern school coincided with the chaotic years of strife among the war lords that followed the institution of the Republic by Sun Yat

Sen. The period of civil war ended temporarily in 1925 with the death of Sun Yat Sen. After his death Dr. Sun became a legendary figure and a source of strength to the Nation. Only now was a more democratic form of Government actually realized, but at the same time hypernationalistic feeling developed, especially among the students. The slogan "Down with Imperialism" became popular and the unfortunate killing of several Chinese students during an incident in Shanghai set China ablaze. Even the students of Hsiangya voted that all foreigners be shot the next day at dawn and Hume as President of the foreign College figured as Number One on the list. A day of tension developed after this resolution was accepted by the Hsiangya students, but soon the indignation among the young people died like a straw fire and the threat was never realized.

In 1926 the authorities of Hsiangya considered that the time had arrived where the administration of the school should pass from the hands of the foreigner to a thoroughly trained and competent Chinese administrator. As a result Hume resigned in the late summer of 1926 and left Changsha where he had lived and worked during the best part of his life.

It is evident that Hsiangya always remained his "brain child" and with pride he followed the development of the Medical College during the years of peace and war. When in 1938 the Japanese approached Changsha, the whole Faculty with the student body moved westward. There they organized their medical school in temporary crude buildings and kept the light of "Yale in China" burning. In 1943 the college moved to Chungking. Now, at last, victory has come to China and all friends of China expect to hear again soon of the outstanding scientific and medical work of "Yale in China" after it has returned to its old site in Changsha.

Anyone who wants to become acquainted with the intricate charm of China must read and reread Dr. Hume's book. There are only few men who were so well qualified as he by tradition and education to understand and to appreciate the soul of China. None could act better as an interpreter of life in central China during the last years of the Manchus and the first decades of the Republic. No one could depict as vividly and understandingly the "successful approach of a foreign physician to China's citadel by way of friendship."

The Mount Sinai Hospital I. SNAPPER

ANIBAL RUIZ MORENO. *La Medicina en la Legislacion Medioeval Española.* Buenos Aires: "El Ateneo," 1946. vi+202 pp.

THE history of Spanish medicine is dealt with rather cavalierly in most general histories of medicine. Due obeisance is made to the Moslem period in Spain, occasional reference is made to the medicine of the *Siglo de oro,* but otherwise the medicine of Spain remains a blank page for most Americans. It is indeed unfortunate that there has not yet appeared in English a history of this intriguing phase of medical development.

In the meantime, it remains necessary to rely upon monographs and studies in Spanish. A recent and excellent contribution is Dr. Moreno's investigation of

medicine in the legislation of medieval Spain. This study is based chiefly upon an analysis of medieval municipal statutes (*Fueros municipales*); in addition use was made of chronicles, romances, histories, and other literary materials of medieval Spain.

The book is divided into 18 chapters that deal with the following subjects: royal physicians, medical education, medical practice, fees, surgeons, apothecaries, hospitals, military medicine, prostitution and sodomy, rape, pregnancy, abortion and infanticide, castration, impotence, wet nurses, personal hygiene and public health, handicapped persons (the mentally ill, the blind, the deaf, and the mute), poisoning, hermaphroditism, marriage, and monsters. Clearly a wide variety of subjects, but the reader soon realizes that most of these topics fall under the general headings of forensic medicine, public health, and the regulation of medical practice.

Dr. Moreno is to be commended for the diligence and industry with which he has carried out his self-set task. Perhaps he will continue in his studies of this period and provide us with a full-dress history of medieval Spanish medicine. Unfortunately, the present book has no index, but the numerous chapter headings alleviate this lack to some extent.

GEORGE ROSEN

LYNN THORNDIKE (assisted by Francis S. Benjamin, Jr.). *The Herbal of Rufinus.* Chicago: University of Chicago Press, 1946. xliii+476 pp. $5.00.

THIS volume is a noteworthy example of cooperative effort. It marks the launching, during the war years, of a program of publishing "A Corpus of Mediaeval Scientific Texts" under the joint sponsorship of the Mediaeval Academy of America and the University of Chicago. This, the initial volume, was financed by the American Council of Learned Societies and Columbia University. It will be welcomed especially by medieval herbalists, inasmuch as it makes available an important, hitherto unpublished, thirteenth-century text. The fact that Rufinus' herbal is found in a unique manuscript (in the Laurentian Library at Florence) makes its publication all the more important. Althought the manuscript came through World War II unharmed, it may well be that our age of increasingly destructive military mechanisms will deprive the scholarly world of many such precious, one-manuscript texts unless they are photographed or published within the next few years.

Professor Thorndike, his collaborators, and the cooperating institutions are to be congratulated on the foresight and energy with which they brought this particular project to such a successful conclusion. The volume appears to be an excellent example of careful textual transcription and scholarly criticism. The introduction (by Professor Thorndike) surveys the life of Rufinus (briefly), the nature of his herbal (with special emphasis on its botanical importance and the accuracy of his personal contributions), Rufinus' written sources, diseases and remedies mentioned in the herbal, and the nature of the manuscript from which the text is derived. One of the most impressive factors in Professor Thorndike's intro-

duction is the objective and scholarly fashion in which he corrects certain of his own earlier assertions concerning Rufinus. Herein he applies the same searching criticism which he has applied in his own reviews of the publications of fellow medievalists. With this excellent example of self-criticism before us, it will not (we trust) be considered hypercritical to mention a few omissions and minor defects. In the reference to editions of the *Herbarium* of Pseudo-Apuleius (p. xiv, note 11) it seems strange that no mention was made of the excellent illustrated edition by Howald and Sigerist (*Pseudo-Apulei Platonici Herbarius,* in *Corpus Medicorum Latinorum,* Leipzig-Berlin, 1927, vol. IV). Stylistically, it might be mentioned that the editor, who has been justly praised for his precise and effective use of English, indulged in some rather un-Thorndikean passages: viz., p. xxvi, line 17 ff., and p. xliii, line 26. Less excusable is the almost verbatim (and apparently unnecessary repetition, on p. xxvi, of the sentence beginning "About one-fifth of our text . . . ," which also appears on p. xvi f. In addition to these obviously minor points, one might take exception to the inference (p. xxxvi) that alphabetical order was never "strictly observed" in medieval handbooks. Examples of highly complicated, if not strictly perfect, alphabetizing of both medical and non-medical compendia are cited in our study of "Medieval Medical Dictionaries and Glossaries" (*Medieval and Historiographical Essays in Honor of James Westfall Thompson,* pp. 246, 249, 260, and 268). Other conclusions of Professor Thorndike (with regard to Rufinus' sources) are open to more serious question. We shall consider them in analyzing the text of the Herbal.

Our major impression of the text (*Rufinus de Virtutibus Herbarum*) is favorable. It is an excellent piece of detailed scholarship. There is a wealth of material quoted by Rufinus from Dioscorides, Platearius' *Circa Instans,* "Macer Floridus" *De Viribus Herbarum,* the *"Tabula Salern[ae],"* *Synonymae,* etc., and in addition Rufinus' own observations. Obviously it is impossible for a reviewer to judge with precision concerning the accuracy of Mr. Benjamin's transcription of the manuscript, since the original is not available for comparison. However, a careful reading of the text reveals no major errors.[1]

But there are textual matters that are more fundamental than these. In the introduction (xxvi f.) Professor Thorndike poses important problems with regard to Rufinus' sources; viz., whether the "opening passages which are unassigned in the present manuscript to anyone in particular" are from Rufinus himself or from Dioscorides (xxvi f.). A good many of these passages appear in large type, an indication (so we infer from xvi f.) that Professor Thorndike considers them to be Rufinus' own contributions.

In our opinion, none of them are. With regard to several (selected from various parts of the text) we have found parallels in the so-called *Alphabetum Galieni*

[1] On p. 157 line 15, we note an apparent misprint, "hee." There are several mechanical factors of format to which one might object, but we suspect that there are logical explanations for all of them. For instance, the complex system of paragraphing, spacing, marginal setbacks, and of critical notes (which are inserted in the text at the end of each folio, often appearing on the opposite side of the sheet from the passage in question), and the alternating of large and small type, are rather confusing. So far as the use of large type is concerned, we were not sure whether it always indicated Rufinus' original contributions (pp. xvii, xxvi f.).

*ad Paternianum,* of which there are manuscripts dating from the eighth, tenth, eleventh, and thirteenth centuries.[2] The following unassigned passages in Rufinus' herbal show definite agreement, in both wording and subject matter, with sections of the *Alphabetum Galieni,* and therefore must be attributed if not to Galen, at least to a pre-Rufinus source: laudanum, petrosellinum, piretron, psillium, ruta, stafisagria, sal, satureia, sedum, vitis, xilocinamomum, ysopum, ypericum, and yreos. A complete collation of Rufinus and the *Alphabetum* would doubtless reveal many more.

In order to illustrate the variations in agreement we quote a pair of corresponding passages which exemplify almost identical agreement, and a pair which exemplify only slight similarity.

[Rufinus, p. 297] SEDUM herba est quam senitium vocant; nascitur in tectis et in petris; folia habens viridia, dens[i]a, similia querci et grossiora et pinguia, tursum subrufum; capitella in sumitate tursi habens in modum viticelle. Vires habet stringentes; eadem prestat que et plantago.

[*Alphabetum Galieni*] Sedum herba est quam aliqui senicion vocant; quae in petris nascitur et super tecta; folia autem habet viridia densa et querco similis et grossula et pinguia solum emittit oblongum flos cellum et subrufum capitula in summum habent in modum verticelli. Vires habet stringentes propter quod similis est plantagine et eadem proficit.

[Rufinus, p. 279] STAFISAGRIA semen est herbe que crescit sicut vitis, a radice fructum auffert, similem ciceris in folliculis triangullis, subrufum, gustu amarum . . . [9 more lines].

[*Alphabetum Galieni*] Stafisagria semen herbae quae flores consimiliter uti erratice, et fructum adferet et foliculis viridibus quasi ceteris triangulum album subrufum gustum acrissimum et amarum . . . [2 more lines, unlike Rufinus].

With regard to the other unassigned passages, which appear in *small* type, we are of a similar opinion; viz., they are not original contributions of Rufinus, but are doubtless from the same source or sources as the Dioscorides-quotations. Most of our samplings (chiefly from the second half of the Herbal) show agreement with the *Alphabetum Galieni.* This is true of the following: mirice, opium, origanum, orobum, oppopopnacum, rafanum, satyrium, and viola manifesting the closest agreement, and opium and orobum the least. We quote examples:

[Rufinus, p. 326] VIOLA habet tres species; est enim alba et aurosa et purpurea. Flores de radice eiusdem hebe excrescunt viride; relaxant et urinam provocant; aliquando partum expellit; lombricos occidit. Flos eius suaviter redolet.

[*Alphabetum Galieni*] Viola species habet iii. Est enim alba purpurea et aurosa; quae flores de radice,eiusdem herbae excrescunt; quorum melior habetur quae est purpurea. Virum omnes viola viscide relaxat sic et urinam provocat; aliquando et partum seman expellitur; et lumbricos occidit; et odorem enim flos ipsa habet suavem.

[Rufinus, p. 124] OPIUM succus est, videlicet lac papaveris, quod colligitur ex tenerioribus capitellis eorum et in sole siccatur. Illud vero est optimum quod est odore gravissimo, colore subruffo, gustu amarissimo: adultera (tum mg) vero ita intelligis, quia non coeret omnino. Illud vero quod ex foliis colligitur et siccatur mocomio appellatur. Potest enim sincere opium lacrimas stringere amixtum colliriis. Iterum circumlinitum refrigerate et aurium dollorem et totius corporis mittigare et sonnum[3] prestare manifestum est. Item opium frigidum et siccum in quarto gradu.

[*Alphabetum Galieni*] Oppium succus est et lacte quod ad modum et radice papaveris

[2] The selected passages from Rufinus were collated with the tenth-eleventh century version of Chartres ms. 62, of which I have complete photostats. The *Alphabetum* has been published only in early editions of Galen; e.g., Venice, Haeredes Juntae, 1541; Basel, Frobenius, 1542, vol. VIII; Lyons, Frellonius, 1550, vol. IV; and Venice, Valgrisius, 1562–1563, vol. VIII. In the near future I plan to publish a survey of the manuscripts and early editions of the *Alphabetum* and the introduction thereto, the *"Vera haec est" Dynamidia.*

[3] Should be amended to read "somnium."

quod si colligit solet per modum quam hoc ipsum papaver. Flores suos amisit et ampullae sua rescunt viridis et tenuarum ipsarum capitula et velut stillarum . . . [3 lines unlike Rufinus] et siccatur in patellis redigitur meponium ampullatur . . . [6 lines unlike Rufinus]. Potest autem sincerem oppium lacriman stringere collirium admixtum. Item circumliniter refrigerat et auricularium dolorem et totius corporis mitigare illa videlicet rationem quam etiam somnium facere dicitur.

It is noteworthy that, in all cases quoted, Rufinus' material seems to be a condensation of the longer descriptions in the *Alphabetum.*

With regard to the passages which Rufinus attributed to Dioscorides, we found parallels similar to those cited above. This would seem to point to a solution of the problem concerning which Professor Thorndike writes as follows: "The circumstance that most of those passages . . . cannot be paralleled in any accessible published version of that author [Dioscorides] makes it impossible to settle this problem" (p. xxvii). In our rather complete comparison of the A's in the *Alphabetum* with corresponding sections of Rufinus' Dioscorides-material, we found fourteen cases of agreement; the same was true of centaurea, ireos, iuniperus, millefolium and narciscus (no samplings were made beyond N, since Dioscorides is not cited in the latter part of the Herbal). Were it not for the exigencies of space in this already lengthy review, we should quote comparative passages, acorus and aconitum as indicative of closest agreement between Rufinus and the *Alphabetum,* and aloes and ireos as indicative of least agreement.

The foregoing analysis, although it does not solve the problems posed by Professor Thorndike, at least indicates that much of the unassigned (and supposedly Rufinus) material was current in earlier medieval handbooks. We are by no means sure that the material in question should be attributed to either Dioscorides or Galen, for there are many materia medica attributed to Dioscorides; and the *Alphabetum Galieni* is considered to be pseudo-Galenic. The upshot of the entire question seems to be that it would be worthwhile, from the standpoint of Rufinus' sources, for Professor Thorndike and/or his collaborators to thoroughly explore the *Alphabetum Galieni* and other early medieval compendia for parallels. Such a survey might result in a reduction of the estimate that one-fifth of the Rufinus Herbal is by Rufinus himself. Furthermore it might lead to interesting conclusions as to the original authorship of medieval compendia that are attributed to ancient authors. Finally, it might lead to much needed critical editions of some of the earlier materia medica. The addition of certain of these to the Corpus of Mediaeval Scientific Texts, so auspiciously begun, would be a valuable contribution to scholarship in this field.

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